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# CAPITAL REQUIREMENTS AND POPULATION GROWTH IN UNDERDEVELOPED COUNTRIES: THEIR INTERRELATIONS\*

"No branch of industry can be carried on...without...capital"  
- Jeremy Bentham

This paper has to do with certain interrelations between capital growth and population growth. In Section I wealth classification is treated; in II, the substitutability of reproducible capital for natural resources; in III, the shortage, use, and formation of capital; in IV, the impact of population and income growth upon capital requirements; in V, the impact of income growth upon population growth.

## I. The Composition of a Society's Wealth or Capital

By wealth is meant the economically scarce tangible or material objects (exclusive of human beings) at the disposal of men (as individuals or as members of groups) for use in the production of goods and services.<sup>1</sup> We shall sometimes use the term capital as a synonym for wealth, or for a category of wealth, though we recognize that the term usually is used to denote the discounted or present value of expected income flowing to the owners of wealth or to the beneficiaries of particular contractual arrangements. Whilst human beings are excluded from the category of wealth (since under normal accounting conventions a value is not set upon them), cognizance must be taken of the fact that goods and services may be diverted to capital formation, or utilized to improve the health and education, and hence the productive power, of individuals. For the decline in the rate at which physical capital is formed may be offset in part by an increase in the rate of investment in the improvement of human beings. For example, in the United States in 1950 when national income approximated \$241 billion, savings approximated \$31 billion, and expenditures on civilian health and education, 12.7 and 10.5 (of which 2.1 went for higher education). Since expenditures for health, education, etc., are relatively greater in developed than in underdeveloped countries, the rate at which capital is really formed in the former must be appreciably in excess of 3 times the corresponding rate obtaining in the latter, even though the rates at which nonhuman capital is formed in advanced countries have often been about three times those found in many underdeveloped countries.

For purposes of the present discussion three methods of classifying a society's wealth are considered.

(i) The tangible wealth wherewith men work\*\*, or whence they derive income, is distinguishable into that which is [I.A] reproducible (i.e., Reproducible Wealth, hereinafter called RW) and that which is [I.B] not directly reproducible (i.e., Nonreproducible Wealth, hereinafter called NRW).<sup>2</sup> Within the latter category belong accessible minerals, favorableness of terrain and transfer conditions, landed surface and (in large measure) utilizable land, etc.<sup>3</sup>

\* This paper is an expansion of one presented at the World Population Conference, Rome, 1954.

\*\* Table I contains a summary of the classifications of wealth which are laid out in (i), (ii), and (iii).

It has been estimated that in Western Europe and the United States at any moment in time since 1870 something like 0.2-0.35 of the net national product (hereinafter called NNP) has been imputable to the tangible wealth that is employed jointly with labor; the balance, 0.65-0.8, has been imputable to human services. If, however, one views productive experience in the long run, one infers that improvements in technique, organization, etc., may have been responsible for 0.25-0.5 of the average annual increment in NNP [Tinbergen 1942; Clark 1951, ch. 11; Douglas 1948].<sup>4</sup> The fruits of these improvements are distributed among the cooperating agents of production by the price system, with the result that they appear to be products of these agents as such.<sup>5</sup>

Inasmuch as *NRW* is nonaugmentable whereas *KW* is augmentable, population growth tends eventually to be accompanied by several effects, given probable conditions. (1) Let it be assumed that a society is technologically progressive, that its favorably-situated members are adequately disposed to form capital, and that *KW* is sufficiently substitutable for *NRW*. (a) Then, as population grows, the ratio of the value of *NRW* to population tends eventually to fall whilst that of *KW* to population tends to rise; and *pari passu*, as NNP rises, the ratio of the value of *NRW* to NNP falls whilst that of *KW* to NNP rises. (b) Furthermore, as per capita income rises (i.e., as the ratio of NNP to population rises), the proportion of a society's NNP imputable to *NRW* tends to decline, even though population continues to increase; and so eventually does the ratio of the cost of raw materials to that of finished goods and services. Tendencies (a) and (b) run counter to the expectations of some early nineteenth century writers who expected that, as population grew, land would become ever more scarce, with output per head falling and the proportion of output going to the landlord increasing.<sup>6</sup> These writers supposed, of course, that technology would improve very little, and that land-lacking societies would not be able to overcome shortage of land by importing the products of land, or by developing substitutes for these products.

The experience of the late nineteenth and/or the present century lends some support to what has been said. In the United States while *KW* per head (expressed in constant dollars) continued to increase about 2 per cent per year, the value of land per head (here used to represent *NRW*) by 1950 had descended below the 1900 level after having risen between 1805 and the early twentieth century. The ratio of *NRW* to NNP eventually fell, but apparently not until after the 1920's. That of *KW* to NNP rose between 1879 and 1934, but thereafter descended to an early twentieth century level [Goldsmith 1952, pp. 30, 78, 82, 86; Kuznets 1952, pp. 269, 272, 278, 307; Goldsmith 1951]. In a number of West-European countries and even in Japan the relative importance of land and/or of agriculture as a source of NNP has declined markedly, but this trend has not been pronounced in countries that are underdeveloped or suffering from great population pressure [Clark 1951, esp. ch. 10; Schultz 1953, ch. 8; Gilbert 1953, ch. 2-3; and unpublished estimates prepared for the International Association for Research in Wealth and Income, 1951 and 1953]. It is the decline in the relative importance of agriculture, traceable to low elasticities of demand for agricultural products, that is primarily responsible for the decline in the ratio of the value of all raw materials consumed to the value of finished goods when such a decline has occurred. Thus in the United States this ratio fell from 24.3 to 12.7 per cent between 1900 and 1950, though meanwhile the ratio of the value of minerals (except gold) to Gross National Product (hereinafter called GNP) rose slightly from about 3.0 per cent to about 3.7 per cent. The amount of energy required per unit of real income, but not its relative value, has fallen appreciably in the United States; elsewhere it has shown a tendency to level off for the time being.

The empirical trends noted reflect the fact that the elasticity of substitution of *KW* for *NRW* has been sufficiently great to reduce the relative



importance of the latter. It has been so great because of the combined influence of international trade, technological changes, discoveries, and changes in the composition of consumer demand as consumption per head has risen. Should some of these substitution-favoring forces lose strength, and should the elasticity of substitution of *RW* for *NEW* in a nation's economy as a whole fall below unity, the share of income imputable to *NEW* will rise even as some of the early classical writers anticipated. It is to be expected that initially, as underdeveloped countries advance, *NEW* will decline in relative importance, but that in time the progress of population and industrialization may again increase the relative importance of *NEW*.

(2) An increasing relative scarcity of *NEW*, consequent from a society's continuing population growth, must, in time, operate to decelerate (if not to prevent) the growth of its *NNP* per capita unless somehow steps can be taken by a society to counterbalance the failure of its *NEW* to grow in physical amount. One cannot dig the same ton of ore twice. Among the countervailing steps available the following are of greatest importance to given countries: importation of *NEW*, or of its products, from abroad on satisfactory terms; reductions in the input of *NEW* per unit of output (e.g., by increasing the efficiency with which energy, crop land, etc., are utilized); development of essentially man-made substitutes (i.e., forms of *RW*) for *NEW*; and the discovery of relatively plentiful forms of *NEW* and their substitution for relatively scarce forms of *NEW* (e.g., substitution of coal for wood when woodland was limited).<sup>7</sup> The first of these courses is not open to the world as a whole; and the last is of limited effectiveness, the discoverable being limited, unless there takes place remarkable advances in service and applied technology.

(3) When *NNP* is growing (because the labor force and/or output per worker is growing), both the extensiveness and the intensiveness with which a society utilizes its *NEW* increases, since increasingly inferior grades of *NEW* are brought into use and the grades already in use are utilized more intensively.<sup>8</sup> By contrast, it is principally the extensiveness with which *RW* is utilized that increases. For, since *RW* is comparatively augmentable by definition, its quantity is continually augmented in anticipation of increases in requirements occasioned by the progress of *NNP* or *GNP*; there does not exist so much pressure to economize in its use as in that of *NEW*.

(ii) While there always exists a continuum of investment opportunities ranging from those giving promise of negligible yields to those offering high yields, we shall simply classify elements of wealth and investment opportunities into [II.A] those which contribute significantly to the production of *NNP* and [II.B] those which contribute little or not at all thereto. Under class [II.A] fall most of the elements described under (iii) below. Into class [II.B] fall unproductive assets: [II.B.1] hoarded wealth which does not perform a reserve or inventory function (e.g., gold reserve in a monetary system), together with a considerable fraction of a society's precious stones and metals, ecclesiastical edifices, patriotic monuments, etc.; and [II.B.2] standby wealth (e.g., standby plants, subsoil wealth not yet exploited) which, though capable of contributing to the production of *NNP*, is not currently being so utilized. When resources are employed in the production of [II.B.1], they cannot be employed in the production of *NNP* and the formation of productive wealth.<sup>9</sup> The diversion of resources from the production of class [II.B.1] wealth to that of class [II.A] wealth therefore serves to accelerate the growth of *NNP* and to counterbalance somewhat the income-depressing effects of population growth. Not much can be done, however, in respect of class [II.B.2] wealth. For, while such forms as standby plants can be held to a necessary minimum, it does not pay to increase the rate of use of subsoil wealth (most of which is depletable) above the optimal level.

(iii) Wealth which contributes to the increase of *NNP*--i.e., elements falling in class [II.A] described under (ii) above--may be distributed into three

categories: [II.A.1.a] directly productive capital; [II.A.1.b] economic overhead capital; [II.A.1.c] social overhead capital. Within [II.A.1.a] fall elements (e.g., structures, equipment, etc.) which are utilized directly by persons who are engaged in extractive activities, in industry and manufacturing, or in the supply of certain services. Under [II.A.1.b] may be placed elements (e.g., transportation, communication, power, irrigation, drainage, soil conservation, and similar facilities) which are utilized indirectly to make possible productive activities of the sort included under [II.A.1.a]. [II.A.1.c] embraces elements (e.g., sanitation, educational, housing, social welfare, etc., facilities) which, whilst serving to improve the quality of the population and the milieu within which it resides, both create income and augment the capacities of individuals to produce income.<sup>10</sup> Presumably, as an economy progresses, the relative amount of investment placed in social overhead capital [II.A.1.c] tends to rise.

Several observations may be made respecting each of these categories. Elements of direct overhead capital [II.A.1.a] contribute more immediately and directly to the augmentation of NNP and/or the increase of a nation's productive power than do most elements of social overhead capital [II.A.1.c] and many elements of economic overhead capital [II.A.1.b]. Furthermore, direct overhead capital elements tend to be less lumpy than are some elements of economic and social overhead capital; hence the stock of direct overhead capital can be kept somewhat more nicely adjusted to the growth of NNP than can that of economic and social overhead capital, these often being built in advance of the time when they can be fully used (though their construction sometimes does not keep pace with NNP). Accordingly, when, in low-income countries, capital is scarce and the rate of discount is high, investment in direct overhead capital tends to be given preference over than in economic overhead capital, and investment in these may be given preference over investment in social overhead capital. Within a considerable range apparently the marginal efficiency of capital invested in direct overhead capital is considered to be higher than that of capital invested in economic and/or social overhead capital. Insofar as this is the case it probably has its origin in the fact that both the minimum required scale of investment and the minimum required degree of anticipation of the future are greater with respect to economic and social overhead capital than with respect to direct overhead capital, when each is treated as a whole.

Because of the conditions just noted, investment may tend to be carried less far, under private auspices, in elements in economic and social overhead capital than in elements in direct overhead capital. This tendency is further accentuated insofar as the marginal private benefits attendant upon investment in economic and social overhead capital tend to fall short of their marginal social benefits. This discrepancy has its origin in the fact that some elements included under economic and social overhead capital must be constructed long in advance of the time when they will be fully used, and that many elements in both categories produce beneficial effects for which investors in these elements are not remunerated. The discrepancy may be accentuated furthermore by the fact that investment in any one category of elements tends to increase the demand for, and the return to, elements included in the other two categories, since each category is essentially complementary to the other two. Because of this discrepancy optimum resource use often requires that investment in some economic and social overhead capital elements be subsidized by the state or carried out directly by the state, since when this is not done investment in these categories tends to fall even more short of the optimum than does investment in direct overhead capital under conditions of the sort obtaining in advanced countries. In underdeveloped countries, as has been implied, the discrepancy between marginal private and marginal social benefit tends to be greater than in advanced countries, because of the comparative indivisibility of various forms of investment, because it is harder to achieve balanced growth, and because the international flow of goods and services consequent upon foreign investment in an underdeveloped countries may not optimize welfare and capital-allocation therein.<sup>11</sup>

Table 1.Summary of Classifications of Wealth

## I. Reproducibility.

- A. Reproducible wealth (RW)--i.e., wealth which may be increased by investment, e.g., any manufactured item of capital, fertility of soils, etc.
- B. Nonreproducible wealth (NRW)--i.e., wealth which may not be increased by the investment process, e.g., mineral deposits.

## II. Contribution to the production of net national product (NNP).

- A. Wealth forms which contribute significantly to the production of NNP (productive assets).

## 1. Overhead capital.

- a. Directly productive overhead capital--structures and equipment utilized directly by persons who are engaged in extractive activities, industry, and manufacturing or in the supply of certain services.
- b. Economic overhead capital--elements (e.g., transportation, communication, power, irrigation, drainage, soil conservation, etc.) which are utilized indirectly to make possible productive activities of the sort included under [II.A.1.a].
- c. Social overhead capital--elements (e.g., sanitation, educational, housing, social welfare, etc., facilities) which, while serving to improve the quality of the population and the milieu within which it resides, both create income and augment the capacities of individuals to produce income.

- 2. Working capital--inventories of real and monetary assets which are used to facilitate the process of production in its ongoing state, e.g., inventories of raw and semi-processed materials, spare parts for output and for capital equipment items, balances of cash or liquid assets which facilitate purchase and sale of inputs and outputs, gold reserve in a monetary system.

- B. Wealth forms which do not contribute significantly to the production of NNP (unproductive assets).

- 1. Hoarded wealth which does not perform a reserve or inventory function, plus a large fraction of precious stones and metals, ecclesiastical edifices, patriotic monuments, etc.
- 2. Standby wealth, e.g., standby plants, subsoil wealth not yet exploited, which, though capable of contributing to the production of NNP, is not currently being so utilized. Resources employed in the production of [II.B.2] are also included in [II.B.2].

The state may intervene (e.g., the Russian state's favoritism of scientific and engineering education over other forms) to induce greater investment in the relatively more productive forms of wealth included in economic and social overhead capital, or otherwise plan investment. It is quite possible, however, that such investment will then be carried beyond the optimum level, particularly when the government in control of the apparatus of state is dependent upon the masses for political support. For central planners are not always likely to be better informed, or less immune to error, than are private investors. In practice discrepancy between marginal private and marginal social benefit, given suitable definition of the latter, can be reduced in some instances and in some degree, but it can rarely ever be removed entirely.

Implications of the preceding discussion may now be noted. (1) The tendency for the rate of growth of NNP per head to diminish, particularly if population continues to grow, is largely attributable to the fact that KW is imperfectly substitutable for NRW. This tendency will increase insofar as the substitutability of KW for NRW diminishes. (2) While the rate of growth of NNP per head may be augmented by converting into productive wealth resources that have been assuming unproductive form, the resulting gain is not likely to exceed that realizable from a 3-5 per cent capital formation rate. (3) The distinction of investment into that which is more immediately productive and that which, being in the form of economic or social overhead capital, is less immediately productive serves to direct attention to difficulties attendant upon securing an efficient allocation of capital resources among uses; but it envisages the allocation problem in essentially static terms, thereby neglecting the population effect of investment. (4) What is really wanted, as will be seen, is investment that is revolutionary and culture-changing in effect--investment that operates to substitute modern for old social patterns and to dissipate the complex of institutions and values that make for high age-specific fertility; for only such investment is well suited to raise per capita income in underdeveloped countries.

## II. Capital Requirements and the Extent of Natural-Resource Exploitation

Countries differ in respect of the pressure they are under to exploit their stock of natural resources or NRW. This pressure arises immediately from the increase of NNP, since the requirement of NRW tends to rise (though not necessarily in proportion) as NNP rises, and ultimately from the fact that the growth of NNP depends upon the increase of both population and output per head. Near one pole we encounter a somewhat developed country like Japan, overpopulated and with a considerable growth of population still in prospect, and suffering from extreme deficiencies in the domestic supply of food, fibers, wood, minerals for chemical manufacturing, metals, coking coal, and liquid fuels. Near the other pole we encounter a country like the United States, with an abundance of resources, with imports amounting to only 4-5 per cent of GNP, and with most of its raw materials of domestic provenience.<sup>12</sup> In Japan pressure upon resources arises principally from the comparative magnitude of the population; in the United States, where per capita consumption of raw materials exceeds 10 times that of the rest of the free world, pressure upon resources arises primarily from the comparative magnitude of per capita consumption. Even so the United States is not under nearly so great compulsion to exploit its domestic resources intensively as is Japan, whose situation fore-shadows that awaiting underdeveloped but heavily peopled countries when they become industrialized.

The full significance of pressure of numbers upon resources, or NRW, is not easy to gauge. Consider the United States. In 1950 the value of all raw materials consumed, exclusive of gold, approximated 12.8 per cent of GNP. The corresponding figures for agricultural raw materials were: foods, 6.7; nonfoods,



1.4; all, 8.1. Those for minerals, exclusive of gold, were 3.7, with mineral fuels approximating 2.5. Comparison of these proportions with those obtaining in 1900 indicate that, as a society progresses, aggregate raw-material consumption increases more rapidly than population but less rapidly than GNP, consumption per head having increased only about one-fifth in this 50-year interval. The input-cost of raw materials will rise more rapidly than the consumption of raw materials, of course, if, as is probable, the production and extraction of raw materials become relatively more difficult as time passes, depletion proceeds, and other limitational forces become operative.

Evidently a considerable increase in the input-cost of raw materials would affect GNP per head in much lesser measure. For example, with other conditions given, a 50 per cent increase in the cost of these materials would diminish per capita GNP only about 6 per cent; while, if the cost increase were confined to nonagricultural raw materials, GNP per head would decline only about 2 per cent. Of course, in economies in which a larger fraction of inputs was required to supply the requirement of agricultural and other raw materials, the impact upon GNP per head of a 50 per cent increase in raw-material costs would be greater; but it would still be relatively small. Presumably, therefore, and as a rule, it is not so much the comparative scarcity and costliness of raw materials that presently is of primary significance. It is rather the fact that, unless the requisite raw materials are to be had, it is not possible to establish and maintain certain industries and to bring into being the various industries ancillary to those in which availability of raw materials plays an important role.<sup>13</sup> In time, however, if the input-cost of raw materials continued to rise, further increases in their cost would increasingly retard income growth.

A country undergoing continuous population growth may respond by utilizing its equipment of natural resources more intensively, or, if it finds itself short of various resources, by having recourse to international trade and/or the development of domestic substitutes. The impact of continuing population growth tends to be obscured, however, when it is accompanied by changes in both industrial structure and degree of industrial progress. If a country, be its population resource ratio high or low, is relatively underdeveloped, it tends to be a net exporter of foodstuffs and/or raw materials and a net importer of manufactures, whereas, if it is developed, it tends to be a net importer of foodstuffs and raw materials and a net exporter of manufactures. As an underdeveloped country advances, and generally as a country's industrial structure changes, its import requirements change quantitatively and qualitatively, usually with the amount per head increasing. It may be said, therefore, that, given the stage of economic development of countries under analysis, international differences in the composition and relative importance of their imports are attributable primarily to inequalities in the international distribution of resources. At the same time, given GNP per head, countries experiencing increases in population density find themselves more dependent than formerly upon external sources for foodstuffs and/or raw materials in short domestic supply [Hanson 1952; E. A. G. Robinson 1954; Schlote 1952, pp. 51-78; Woytinsky 1955, ch. 1, 3-4].

If a country is long on land and natural resources, it will be under less pressure to form capital (though perhaps more capable of doing so) than if it is short of land and natural resources (as, e.g., is Japan). When land and natural resources remain available for exploitation, there should be less need for capital (*ceteris paribus*), in that relatively large amounts of labor can be set to work in activities using much land and natural resources, and relatively little capital. The activities in question apparently include agriculture, mining, and certain other industries.<sup>14</sup> Insofar as the domestic market for the agricultural, mineral, etc., products of these activities is limited, the products may be exported. When, however, the domestic supply of these products is limited, there is less of them to exchange for capital and other imports. The magnitude of the volume of these imports (*ceteris paribus*) depends, of course,



on the terms on which the exporting country supplies the produce, minerals, etc., and these terms will depend significantly upon the alternative-use value of its labor when devoted to the direct supply of goods and services for the home market [Lewis 1954, pp. 181-189; Scitovsky 1954; Kindleberger 1935; Myint 1954; G. H. Meier 1952].

The burden of our argument is that plentitude of land and natural resources eases the task of capital formation for a country, be it relatively developed or not, particularly when population is growing rapidly. Either the land and natural resources may be partly substituted for capital; or agricultural, mineral, and related products may be exchanged for capital and other essential imports. But there is a limit to this way of proceeding. Land and natural resources are substitutable for capital only within limits, and some forms of capital are complementary to land and/or natural resources. Accordingly, since substitutability is limited and since, in the absence of sufficient complementary capital, labor is not continuously combinable with land and natural resources, the labor force can be fully employed only if there is a sufficiency of capital both to complement land and natural resources and to make possible in addition the employment of all workers not engaged in the exploitation of land and natural resources.<sup>15</sup> Accordingly, even when land and natural resources are abundant, considerable capital formation is needed. In terms of our earlier formulation, *KW* complementary to *NW* and/or labor must be formed if unexploited land and natural resources and underemployed (or unemployed) labor are to be brought into use. But such capital formation is likely to be difficult in a country with low incomes, a low average propensity to form production assets, and comparative scarcity of land and natural resources.

### III. Capital Shortage, Capital Use, and Capital Formation

When, because *NW* per head is low and the stock of *KW* has not been augmented sufficiently to offset the shortage of *NW*, the ratio of a society's wealth to its population is low, this situation may be ameliorated by increasing the rate of capital formation, by avoiding the transformation of productive agents into unproductive assets, and by using with economy the stock of productive assets and the increments thereto.

In 1949 estimated savings rates in underdeveloped countries are said to have ranged, when calculated for large areas, between 3 and 6 per cent of national income in Asia (exclusive of Japan) and Africa, and to have averaged about 8 per cent in Latin America.<sup>16</sup> The reports on savings rates in many of these countries agree in starting these rates to be appreciably below 10 per cent of national income.<sup>17</sup> While recent reports for Asia do not indicate substantial improvement in savings rates, those for Latin America (which, with the partial exception of Middle America, is free of the population pressure characteristic of Asia and the Middle East) indicate considerable saving and a 2.5 per cent per year growth of GNP per capita in various countries in 1935-51. Unfortunately, information is not supplied respecting the capacity of these underdeveloped countries to form both productive and unproductive assets, and so it is not determinable if, as many believe, their asset-forming power is nearly as high, when compared with income, as that found in developed countries [UN (ECAFE) 1954; UN (ECLA) 1954, pp. 31-32].<sup>18</sup>

The task confronting many underdeveloped countries is that of pushing up the rate at which productive wealth is formed from around 5 to 10-15 per cent of national income. This task confronted present-day developed countries when they were underdeveloped, and they apparently accomplished it as a result of a number of changes (e.g., the disposition to save became stronger; a rising rate of growth may have re-enforced itself; income became more unevenly distributed, particularly as a result of the profit-increasing post-1500 price revolution;

the recipients of "surplus value" devoted an increasing fraction of it to capital formation; resources were diverted from forming unproductive to forming productive assets; with the rise of the national state at least some members of the ruling classes came increasingly to look upon capital formation as advantageous) which were not offset by increases in population growth.<sup>19</sup> For, as is shown later, a savings rate of 4-5 per cent is too low to permit much if any economic growth per head when population is growing appreciably.<sup>20</sup> If, however, the required increase in saving can temporarily be achieved, and if there is a sufficiency of natural resources (or ready access thereto), it is quite possible for a self-sustaining growth process to get under way and in time perhaps bring about a reduction in natality and natural increase. This process would be reinforced if real depreciation and obsolescence absorbed a diminished fraction of gross capital formation, in consequence of an increase (within limits) in the life of durable goods, or of a movement (occasioned perhaps by an increase in the rate of growth of the labor force) of the rate of growth of NNP to a higher level; for then the ratio of net to gross capital formation would rise.<sup>21</sup>

Many of the densely populated underdeveloped countries of today must carry on capital formation under less favorable conditions than prevailed in the developing countries of the late eighteenth and early nineteenth centuries. First, in many contemporary underdeveloped countries, population, though already pressing much harder upon cultivable land and natural resources than it did in England and Western Europe 100-200 years ago, is growing much more rapidly today as a result of modern death control, and per capita incomes are much lower.<sup>22</sup> Second, in democracies the influence of the masses is much greater today than it was in the early nineteenth century, with the result that consumption is more stressed than formerly, that wages are often too high to permit as much employment as might be had, that capital formation is retarded, that relatively large fractions of capital increments consist of residential construction and overhead capital, and that in general the influence of interest rates upon the allocation of capital among uses is diminished.<sup>23</sup>

Because of difficulties attendant upon increasing the domestic rate of capital formation in underdeveloped countries, several methods have been suggested for increasing it. (1) So long as there exists a large industrial reserve army of unemployed and underemployed persons in the agricultural and other sectors, labor will be available under conditions of high elasticity of supply, with the result that "surplus value" may for a time increase nearly as rapidly as the nonagricultural labor force and that much of this increase can be appropriated and added to the nation's stock of wealth [Lewis 1954, pp. 140-160, 171-176; Nurkse 1953, pp. 36-47; cp. Rao 1952; Navarrette 1952]. (2) Resources may be forcibly diverted to developmental investment from the formation of unproductive assets, from the consumption of those whose consumption can be diminished, and from output that might otherwise be transferred abroad.<sup>24</sup> (3) Recourse to forced-savings-generating inflation has been recommended by some.<sup>25</sup>

Respecting foreign lending there is controversy concerning the amount that can be utilized. It is argued that, since an underdeveloped country may require more economic-overhead and other forms of capital to get off dead center than it can supply out of domestic savings, it must fall back upon foreign loans, sometimes to such an extent that foreign investment approximates and even exceeds domestic investment [Singer 1952, esp. pp. 10-18; Derksen 1952, pp. 108ff.; UN 1951, pp. 76, 79-80]. But it is also pointed out that the amount of foreign capital available is relatively small, that internal limits may exist to the volume that can be gotten and effectively utilized, and that external conditions may set a ceiling to the net influx of foreign capital. Two sets of internal circumstances (among others) may limit how much foreign capital is to be had and used effectively: (a) the extent to which political and social conditions are favorable (unfavorable) to foreign investment, given a country's economic potential; and (b) the degree to which domestic productive factors (e.g., domestic capital,

labor of appropriate skill, land, natural resources) are available for combination with foreign capital in enterprises involving the joint use of imported and domestically supplied agents of production. An external limit arises from the fact that the annual increment of gross foreign investment in a country must exceed the sum which that country is required to pay abroad each year in the form of interest and amortization charges on cumulated foreign investment. This limit is roughly set, therefore, by the rate at which foreign gross investment can grow, which depends in turn on the changing composition of GNP and on the rate of growth of GNP in the countries whence the foreign investment flows. Conditions (a) and (b) are susceptible of improvement by capital-seeking underdeveloped countries, particularly when these countries are assisted by foreign investors bent on increasing the supply of complementary domestic agents of production (e.g., skills of the labor force, complementary entrepreneurship, the flow of utilizable domestic resources, etc.). Improvement of these conditions may even raise somewhat the financial limit arising from the growth of loan-service charges, since, given the rate of growth of GNP found in foreign-lending countries, these countries will be more disposed to increase their foreign lending when conditions (a) and (b) are favorable than when they are unfavorable. In the past, however, with few and transitory exceptions, foreign countries have furnished but a small fraction of total investment in underdeveloped countries, though they have provided considerable "human capital" in the form of immigrants. Moreover, of the foreign investments made outside of Europe, nearly all have been made in lands where population was relatively sparse and relatively skilled immigrants were disposed to settle, and where exploitable natural resources were relatively abundant. Furthermore, a new difficulty may be encountered: the course of technical progress in a capital-exporting country like the United States may so affect the composition of its GNP as to slow down the growth of its demand for foreign exports and therewith reduce its disposition to invest abroad.<sup>26</sup>

Having found that wealth per head is low in underdeveloped countries, and not easily augmentable out of domestic savings and foreign borrowings, we turn to the problem that is intensified, namely, optimizing the distribution of a nation's wealth and its increment among the actual and potential uses to which wealth may be put. Capital, being scarce, must be rationed by price or other systems in both developed and underdeveloped economies. But since capital is relatively more scarce, compared with other productive agents, in underdeveloped than in developed economies, mistakes in capital rationing in underdeveloped economies are more likely to be serious, or to be difficult to remedy, than are mistakes in capital rationing in developed economies.

Two aspects of capital rationing are of especial relevance for economic growth. (1) As was noted in (ii) in Part I above, growth may be fostered by diverting to economic development the maximum possible fraction of a nation's stock of unproductively used wealth, or at least as much as is compatible with acceptable and maintainable criteria of welfare.<sup>27</sup> (2) Growth is fostered also when optimum use is made of the wealth available for economic development. This involves curtailing the relative amount utilized as social overhead capital (see [iii] in Part I above) and carefully allocating the balance among directly productive and economic-overhead activities. It may also entail so locating new industry and wage jobs as to minimize outlays upon social overhead capital whilst avoiding consequent increases in outlays upon directly productive and economic overhead capital. As A. Lowe [1955] indicates, however, the physical-technical structure of economic systems is often such as to limit greatly investment in low-capital-output activities at the expense of high-capital-output activities.<sup>28</sup>

When, as in nineteenth-century Western countries and in some contemporary totalitarian societies, the influence of the masses is less powerful than in present-day democracies, investment in social overhead capital tends to lag behind both that in directly productive capital and that in economic overhead capital which gives great promise of facilitating economic development. In time,

however, as wealth per head increases and consumer sovereignty and freedom of choice become more powerful, investment in social overhead capital tends to rise. In the United States the fraction of all RW invested in business and agriculture declined from somewhat in excess of seven-tenths in 1850 and 1890 to just over two-fifths in 1939 and 1948. Meanwhile the fraction invested in consumer durables, government wealth, and non-farm residences increased about one-third. Industrial investment seems to have bulked large in early nineteenth-century Britain, with outlays upon transportation, town-building, and foreign investment subsequently becoming dominant; in 1870-1914 expenditure upon housing approximated when it did not exceed that upon railways and machinery, averaging about one-fifth of home investment and (in 1907) about three-fifths of all building. By contrast, during Mexico's income-increasing boom, 1939-1950, building of all kinds comprised but 20.4 per cent of gross domestic investment.<sup>29</sup>

When the ratio of productive wealth to the labor force is low, as in underdeveloped countries, it is arithmetically necessary that this wealth be concentrated in industries in which the capital-labor ratio is low. If we represent by  $R$  the ratio of a country's stock of capital (or productive wealth) to its labor force, and by  $r_1, r_2, \dots, r_n$  the capital-labor ratios found in the  $n$  industries composing that country's economy, it follows that the weighted average of these  $r$ 's must approximate the value of  $R$ , the latter value imposing a restraint upon a country's industrial mix. It is inescapable, accordingly, that the bulk of an underdeveloped country's labor force be engaged in activities in which the typical  $r$ -value is low, given the production coefficients in effect in that country. Accordingly, when lists are compiled of industries supposedly well-suited for introduction and/or expansion in underdeveloped countries, one finds on these lists, beside industries which require relatively little skilled labor, which are small scale, and which (when they are not oriented to raw materials) are scattered rather than concentrated in space, industries in which fixed capital per worker and machinery and equipment per worker are relatively low. When these characteristics are intercorrelated, as happens within limits, choice is easy, but when some characteristics of an industry make it suitable for establishment in an underdeveloped country whereas other characteristics do not, choice is less easy.<sup>30</sup>

It does not follow, of course, that all  $r$ -values must be kept in the neighborhood of  $R$ , even though the selection of some  $r$ -values in excess of  $R$  necessitates the selection of other  $r$ -values below  $R$ . Considerable investment in transportation and public utilities is necessary even though in these industries the capital-labor ratio is high and the ratio of fixed capital to output may be three or more times that obtaining in the economy as a whole [Kuznets 1952, p. 122].<sup>31</sup> If resource conditions warrant, investment in mining is indicated even when the capital-product ratio is relatively high.<sup>32</sup> Of greater importance is the fact that investment usually is indicated in the most advanced technologies and in modes of industrialization entailing the use of fully or almost fully automatic facilities instead of in traditional combinations of capital, skilled operators, and semi-skilled laborers. For then, even though capital investment per worker is high, the ratio of workers and capital to output is relatively low, and there is brought into being a much greater surplus above costs out of which additions can be made to the nation's stock of capital. Sometimes, too, if automation can be carried on outside large cities, heavy investment in urban development can be avoided or postponed and the formation of industrial capital can be further facilitated in consequence. For the time being, until modernization and capital accumulation have proceeded far enough, those who cannot find employment in the technologically advanced sectors of the economy must find it in sectors where the capital-labor ratio is low, or through recourse to more intensive use of advanced forms of capital (e.g., several shifts a day). In the past countries undergoing industrialization have usually introduced the most advanced technologies, in part perhaps because a country just embarking upon industrialization is relatively free of the obsolescence



and other costs incident to technological change in advanced countries [Gerschenkron 1952, pp. 5-9; Frankel 1955; R. L. Meier 1954].

Respecting the allocation of capital in capital-poor underdeveloped countries, the following conclusions appear valid. (1) Since economic overhead capital often is of strategic importance, investment therein frequently cannot be greatly restricted even though a nation's stock of capital and current savings are small. (2) The influence of the masses, when not held in check, intensifies the demand for social overhead capital, and this demand is re-enforced by the fact that it is usually supplied under governmental auspices. (3) When foreign exchange is in short supply, the formation of low-import-content capital (e.g., building) tends to be favored, and exchange tends to be used to purchase imports important for economic development. (4) It is essential, though not always easy, to emphasize types of investment which make for increasing returns. (5) A capital-short society is compelled to favor many activities marked by relatively low capital-labor and capital-product ratios. (6) High capital-product-ratio investments are indicated, however, when shortages of strategically necessary economic overhead capital must be made up, or when technologically advanced methods entailing relatively high ratios are superior, from the standpoint of the whole economy, to less advanced methods. (7) Given that acceleration of the rate of growth of NNP is sought, investment in directly productive capital and in strategical forms of economic overhead capital should be emphasized whilst that in social overhead capital should be carefully rationed.

#### IV. Population Growth, Income Growth, and Capital Growth

Having considered problems associated with the supply and allocation of capital or productive wealth, we shall examine the effects of population growth upon the aggregate of capital requirements.<sup>33</sup> A nation's capital requirements may be estimated in two ways: (1) by determining how much capital is required to equip a representative worker, newly added to the non-rural labor force by natural growth or by urbanward migration, and how much additional wealth is required for residential and other purposes and for rural improvement;<sup>34</sup> (2) by making use of the relationship obtaining between wealth and income. It is this relationship, together with the effects of population growth upon it, that will now be considered.

Let us call the average propensity to form capital  $a$ ; the ratio of a nation's national income (or NNP) to its wealth,  $s$ ; the annual percentage rate of population growth,  $p$ ; per capita income,  $y$ ; and the average annual rate of growth of  $y$ ,  $y'$ . Let us assume, furthermore, that  $a$  and  $s$  are constant, and that their values are independent of  $p$ . Then  $g = as$ ; or, to illustrate, if  $a$  approximates 0.1 in value and  $s$  approximates 0.2 in value,  $g$  will approximate 0.02, or 2 per cent per year. The value of  $y'$ , under these circumstances, will be  $(1 + g) / (1 + p)$ ; or, if  $p$  approximates 1 per cent per year when  $g$  has a value of 2 per cent,  $y'$  will approximate 1 per cent per year. Furthermore, if we are given a value for  $s$ , we can easily determine the value  $a$  must assume, if a given rate  $p$  of population growth is not to result in a fall in per capita income  $y$ , for the value of  $a$  must approximate  $p(1/s)$ . Thus if population grows at an annual rate of  $p = 2$  per cent per year, and  $s$  has a value of 0.2,  $a$  must approximate 10 per cent, since otherwise per capita income  $y$  would decline. If it is desired, furthermore, that per capita income grow at a rate  $y'$  per year, the value of  $a$  must approximate  $(1/s)(p + y')$ .<sup>35</sup> Thus, if population is growing 1 per cent per year, and it is desired that per capita income increase 1.5 per cent per year, the proportion of the annual income that must be saved and invested is 12.5 per cent when the value of  $s$  is 0.2.

The figures we have presented throw some light on why per capita income could rise in pre-industrial European countries such as England even though the



rate of capital formation was low. We noted earlier that in England between 1688 and 1770 per capita income may have increased by something like one per cent per year even though the gross saving rate probably was not much above 5 per cent of GNP. Had  $s$  a value of 0.2 in England at that time, a 5 per cent saving rate might have been adequate to permit an annual increase of 1 per cent per capita income in the absence of any population growth. During this period, however, population was growing very slowly, only about  $1/4$  per cent per year. The then low rate of saving permitted an increase in per capita income only because the rate of population growth was so low and nearly all the capital formed could be used to increase per capita income. Had population grown one per cent per year as in the century succeeding 1760, the then low rate of capital formation could have permitted very little increase in per capita income.

On the assumptions we have been making, it will be difficult for the more densely populated underdeveloped countries to increase per capita income rapidly. For, because of the spread of Western methods of death control to underdeveloped countries, some densely populated and some not so densely populated, mortality has fallen remarkably while natality has remained very high; as a result natural increase often equals 3 per cent per year, a rate higher than prevailed in the United States in 1800-1860. If we put their typical rate of population growth at 2-3 per cent per year and assume  $s$  has a value of 0.2, a saving rate of something like 10-15 per cent per year is required if per capita income is not to decline. If it be desired that  $y$  (per capita income) is not to decline, but rather to increase 1.5 per cent per year, with population growing 2 per cent per year, a saving rate or  $a$  value of something like 22.5 per cent is indicated. When the value of  $a$  is so low as barely to prevent a decline in per capita income, given the prevailing rate of population growth, and when in addition there is much pressure upon the central authorities to take steps to increase per capita income, the adoption of inflationary policies is likely. Such policies eventuate when, intentionally or otherwise, the central authorities, lacking access to a sufficiency of voluntary savings, have recourse to the credit- or money-creating powers of the banking system.

Let us consider now what values  $a$  and  $s$  have assumed in various countries. The value of  $a$  appears to have ranged between zero and perhaps as high as one-fifth, with rates usually falling within a 10-15 per cent range in late-nineteenth-century Western Europe and the United States. Population growth tends to reduce the value of  $a$ , since it absorbs resources, a portion of which might otherwise have assumed the form of capital; but the effect of such growth is diminished when a large proportion of a nation's savings is supplied by high-income receivers and collective bodies (especially corporations).<sup>36</sup> The value of  $s$  depends upon what is included under "wealth", being much higher when only  $RW$  and  $NRW$  are included, and higher still when only fixed capital is included. Presumably, all wealth should be included, since when consumers are sovereign and free, a nation does not devote all of its  $RW$  and  $NRW$  to activities whence flows income as defined in income estimates. In the past half century or more  $s$  has taken a value of around 0.2 in the United States when all wealth is included, and a value of 0.17 to 0.25 in other countries [Goldsmith 1951; and 1952, pp. 298-302].<sup>37</sup> Other conditions being given, the value of  $s$  should be higher if only  $RW$  is included in the category of wealth compared with the category of income, and income imputable to  $NRW$  is not excluded from this category. This expectation is borne out in that the value of  $s$  in Australia, Canada, and the United States--usually within the range 0.3 to 0.33--has been higher than that found in Britain, France, Germany, and the Netherlands--usually 0.15 to 0.22; it is also borne out in that the ratio fell in Britain and France in the 60 years preceding 1913 [Clark 1951, ch. 11; Kuznets 1952, p. 82; Kuznets 1954a].

The average value of  $s$  is not constant, its marginal value sometimes rising above and sometimes falling below its average value. It rises (falls) in consequence of forces which increase (decrease) income more than wealth. Among the

forces (other than population growth) which increase  $s$  are the following: increase in the number of hours per year capital equipment is worked; increase in the intensity with which  $NKW$  and economic and social overhead capital (built in advance of its full use) are employed;<sup>38</sup> increase in output attributable to increase in the rate of technological progress and the operation of the law of increasing return; increase in the relative importance of industries with low capital-output ratios;<sup>39</sup> decrease in the average life of the goods and services composing GNP [Goldsmith 1952, pp. 293, 298-299, 302-303]; and decrease in the rate of capital formation. Also included among these forces are increases in the proportion of wealth that is used to produce income--increases, that is, in the ratio of productive to unproductive assets, and (probably) in the ratio of directly productive and economic-overhead capital to social overhead capital (see Section I, iii). Forces of a sort opposite to those enumerated make for a decrease in  $s$ .

The level of population growth was not included among the forces treated in the preceding paragraph, nor was it indicated whether  $s$ -increasing or  $s$ -decreasing forces tend to be dominant. An increase (decrease) in the rate of growth of the labor force serves to increase (decrease)  $s$ . To illustrate: suppose that, given constant returns and the current capital-labor ratio, the ratio of capital to income is 4 to 1, and the marginal productivities of the incremental units of capital and labor are 0.3 and 0.7, respectively. Then, if both the stock of capital and the labor force increase 1 per cent, income will increase 1 per cent, income per worker will be unaffected, and the capital-labor ratio will be unchanged at 4:1, with the value of  $s$  continuing at 0.25. If the labor force grew more than 1 per cent, the value of  $s$  would rise above 0.25. Now suppose that population remains constant, while capital is increased 1 per cent by the 4 per cent saving rate. The 1 per cent increase in capital is accompanied by a 0.3 per cent increase in income; but no increase in income is traceable to an increment in the labor force, since this force has remained constant. The resulting capital-income ratio then becomes 4.04:1.003, and the value of  $s$  becomes 0.248. In sum, with population constant, the value of  $s$  will remain constant only if other income-increasing forces become powerful enough to offset the failure of the labor force to increase (e.g., if the rate of capital formation approximated 13 instead of 4 per cent). It is to be expected, therefore, that (*ceteris paribus*) as a country developed and the relative importance of land ( $NKW$ ) declined, the ratio of income to  $NKW$  would fall.<sup>40</sup>

Let us suppose, in view of what has been said, that savings in the amount of 4-5 per cent per year of national income are necessary to counterbalance a 1 per cent per year rate of population growth, or to make possible a 1 per cent per year rate of income growth. Then a saving rate of 8-10 per cent is required to enable a population to grow 1 per cent per year and at the same time experience an increase of 1 per cent per year in per capita income. If each of these growth rates is doubled, the required saving rate becomes 16-20 per cent per year. These required rates--essentially rough orders of magnitude--might prove too high, given a rapid introduction into an underdeveloped country of advanced methods used abroad, given that capital-output ratios in industries using the new methods are not unduly high, and given that countervailing forces (e.g., rising rate of capital formation; prolongation of average life of output) are not operative. If, however,  $NKW$  is in full and intensive use, or if much of the annual increment in assets is used unproductively, the required rate of saving may have to be higher than those given above.

#### V. Capital Formation, Income Growth, and Population Growth

While an increase in the rate at which a society forms capital may temporarily divert resources from the formation of population, it will increase

that society's population capacity in the longer run, *ceteris paribus*, and it may cause that society's population to be larger than it would have been in the absence of the supposed increase in its rate of capital formation.

An increase in a society's rate of capital formation will augment its population capacity, since population growth depends (*ceteris paribus*) upon the growth of NNP, and NNP is greater, other things equal, when a society's stock of income-producing wealth is greater. But the extent to which an increase in a society's population capacity is accompanied by an increase in population turns on the manner in which other things cease to be equal. For the aspirations of the bulk of the population tend to change, particularly when heavy investment transforms the socio-economic system; when many individuals find themselves shifted into new social milieux, some of which at least are relatively unfavorable to procreation; and when still others find themselves within the grasp of new consumption patterns that may or may not conduce to reproduction.

Given an increase in a society's rate of capital formation and in its population capacity, the demographic response of its members will turn principally on whether the quantity and the quality of their aspirations change, on how they change, and on their expectations respecting their capacity to realize old and newly acquired aspirations. Aspirations being given, whatever increases the expectation that these will be more fully realized must operate temporarily to augment the longer-run rate of population growth; for, population being temporarily elastic to an increase in income consequent upon an increase in a society's capital stock, such increase must elicit some population growth. Capacity and expectations being given, whatever increases (decreases) the overall quantity of these aspirations, their composition remaining unchanged, operates to reduce (increase) the long-run rate of population growth; and whatever decreases (increases) the relative importance of procreation-favoring aspirations, the quantity of aspirations remaining unchanged, operates to decrease (increase) the long-run rate of population growth. Finally, capacity and expectations being given, the rate of population growth varies with the quality or composition of prevailing aspirations, since these may be more or less favorable to fertility and life expectancy. Should the shock attendant on the maintenance, for a few years, of a very heavy rate of investment sufficiently increase the quantity and/or appropriately modify the quality of a people's aspirations, their number would not increase as much as it would have increased given a lower rate of investment and a smaller increase in economic capacity.

Expectations respecting capacity to realize aspirations may affect, as well as be affected by, aspirations. Improved expectations tend to generate (especially when realized) increases in aspirations, particularly when the increment in capacity is of a form (e.g., some consumers' durables) with which imperfectly anticipated complementary wants are associated, or of a kind with which an increase in security against old age is correlated. With an increment in aspirations favorable to procreation, an increment or a decrement in the favorableness of expectations respecting capacity may be associated, though a decrement is likely to be encountered when incomes are very low. With an increment in aspirations neutral or unfavorable to procreation, an increment in the favorableness of expectations respecting capacity is likely to be correlated. The interrelations that actually obtain vary with culture; they must be determined empirically before quantitatively meaningful statements may be made concerning them. In sum, an increase in a society's productive capacity, associated with an increase in its capital stock originating in fuller employment, technological improvements, lessened discounting of the future, etc., must operate, until an offsetting adjustment in aspirations takes place, to reduce mortality, especially if high initially, (possibly) to increase natality, and to extend the period during which a given rate of population growth can be

accommodated. Since empirical data indicate that both high and low rates capital (population) growth have been associated with high (low) rates of capital (population) growth, they can tell us little until the relevant intervening variables have been isolated and assessed.

It has been implied that, so long as aspirations remain unchanged, a society will increase its numbers in consequence of changes making for increases in income per head. It has been further implied that these changes may operate independently of their effects upon income to produce a milieu in which aspirations become less favorable to natality. If these effects are powerful enough, they can produce a decline in the rate of population growth even though the income-increasing changes have increased population capacity; then the negative population effects of these changes may be said to outweigh such positive effects as were associated with income growth. But, as has also been implied, these changes may, under certain circumstances, even operate to reduce natality through the medium of income increase. Moreover, this negative population effect may be intensified by acceleration of the rate of income growth.

In the shorter-run the aggregate effect of an income increase would depend upon the relative amount of influence exercised by those population elements which responded positively, negatively, or not at all to the income increase. The upper range of income-receivers, together with those no longer of reproductive age, could hardly be expected to respond reproductively; their aggregate propensity to save would rise therefore. A second group of income-receivers, situated at various income levels, finding themselves temporarily indisposed to increase their consumption at the same rate as their incomes were increasing, would respond by stepping up their average propensities to save and/or their natality levels. A third group of income-receivers, situated at various income levels above those supplying only "necessities", would reduce their average propensities to save and/or their natality levels. This group, which might be relatively large or relatively small, would include all individuals who, because their income-increments were sufficiently large to generate modification of their consumption patterns and make available the fruits of consumer-goods complementarity and quality-improvement, would experience what amounted to an increase in the marginal utility of their money [Cp. Norris 1952, ch. 11] and (hence) an uncompensated substitution effect in favor of commodities and services and against offspring. If there are enough individuals in this third category, and if, in time, their newly acquired patterns of living are propagated to individuals in the second group, the level of natality will fall despite the increase in income.

What has just been said may be put this way. Families and/or individuals have relatively stable consumption patterns, ordinarily subject only to changes in the small as family income increases or decreases. But there may exist certain goods (e.g., important members of the durable-goods category), the use of which entails a great deal of complementary spending, much of it not foreseen at the time of purchase. These goods might act, within the pattern of consumption, as metastasizing agents which, by the time they had run their course, would have significantly modified the consumption pattern and augmented the cost of this pattern. Since consumer income would not keep pace with the resulting increase in propensity to spend, something would have to give, and this something would be savings and/or procreation, and it would tend to be procreation in greater degree if the family's gross savings plan had already been institutionalized (e.g., insurance, annuity plans, etc.).

In sum, increases in national income, consequent upon increases in the rate of investment and/or effectiveness of resource use, will be favorable, other conditions remaining equal, to increase in natural increase. But other conditions do not remain equal. With income increases are associated changes in socioeconomic structure, in the distribution of the population among socio-economic groups, in aspirations, and in consumption patterns; and these changes almost



certainly tend to be unfavorable in the aggregate to fertility and they may be unfavorable to natural increase. If, as seems probable, the second set of changes is more powerful than the first, circumstances making for an increase in income are likely in time to make for a reduction of the rate of natural increase, especially if the increases are large. If this be the case, a supra-Malthusian population equilibrium must result, with a relatively low natality balancing a relatively low mortality, and with per capita income rising, though possibly at a low rate.

It usually is assumed that the objective of investment is the augmentation of income (or "welfare") per head, but it appears to be taken for granted that this increment in income is to be achieved through augmenting the stock of wealth and facilitating innovation. However, since (within limits) the progress of per capita income is inversely associated with the level of natural increase, the goodness of an investment must be judged both in terms of its capacity to increase NNP and in terms of its capacity to reduce natality and natural increase. More specifically those investments are best which contribute, or which may be enabled to contribute, most effectively to the increase of per capita income in the longer run. This means, as a rule, therefore, that (*ceteris paribus*) those forms of investment which tend in time to depress natality are superior to those which do not. It is in order, therefore, to discover what forms of investment are unfavorable to natality, or can be made unfavorable through the introduction of side conditions.

Let us abstract from the output-increasing effect of investment and note only the population effects of investment. As has been remarked, the influence of investment upon population growth is exercised through two channels, through the income-increasing effect of investment, and through modifications produced by investment in a population's cultural milieu. While effects exercised through the income-channel may or may not be unfavorable to population growth, effects exercised through the second channel tend to reduce the rate of natural increase. Inasmuch as investment is rarely an isolated series of events, its net effect will usually be conditioned by the measures that are made to accompany the process of investing in a line of activity.

It is not possible as yet to indicate with any degree of precision or certainty what forms of investment are relatively unfavorable to natality and what forms are relatively favorable. There follows, however, a speculative indication of the probable population effects of a number of forms of investment. (1) Investment that increases the prices of goods and services entering into the reproduction and rearing of children relative to the prices at which competing goods and services are to be had sets up a not wholly compensated substitution effect against children. Such a change in price structure may be brought about by investment which diminishes the prices of goods and services competitive with children, or by investment which increases the prices of goods and services complementary to children. In the latter category falls investment which accentuates the long-run tendency of the value of units of NKW, expressed in terms of units of RW, to rise. (2) Investment that tends to redistribute population in geographical and social space in a manner calculated to increase the level of aspirations will tend to depress natality. (3) Investment that favors the increase of goods and services the demand for which is relatively elastic is likely to be less favorable to natality than is investment which favors the increase of goods and services the demand for which is relatively inelastic. Agricultural products usually are illustrative of the latter category, though such products may at times encounter an elastic demand in foreign markets. (4) Investment that long continues to swell the monetary purchasing power of the bulk of the labor force faster than it makes available to them consumer goods and services is likely to affect natality adversely. Representative is investment in economic overhead capital and in some forms of social overhead capital. (5) Investment that increases the output of durable and other goods which are well suited to



metastasize otherwise relatively stable consumption patterns affects natality adversely as was shown earlier. (6) Investment which dissipates the tradition-ridden culture patterns of underdeveloped countries and establishes in their places modern, western patterns serves to reduce natality. Most effective of investments of this sort are those which cannot easily be fitted into a society's culture unless many and widely spread patterns of this culture must be changed to accommodate the investment. Illustrative perhaps is extensive electrification or the extension and modernization of transport. (7) Investment which is continued on a large scale and for a long time, particularly if it is strategically distributed in time, is almost certain to augment income sufficiently to compel modernization of living patterns, generate new aspirations, produce widespread cultural change, and set in motion a decline in natality. Small investment for short periods, on the contrary, can do little except increase numbers and make more difficult than ever the escape of a people from a Malthusian trap.<sup>41</sup> (8) Investment which is more rather than less productive of income is the more favorable, in the longer run, to a decline in natality. (9) While investment which reduces infant mortality immediately augments the rate of population growth, it may so increase pressure upon family income as to produce modification of reproductive behavior, but whether it tends to decrease natality sufficiently more than to offset the decrease in infant mortality is doubtful.

### VI. Conclusion

Of the conclusions indicated in this paper the most important are those respecting the importance of capital formation, the difficulties that beset efforts to increase capital per head and thereby increase the rate of technological change, and the need to judge the net efficacy of investment in the light of both its income-producing and its natality-reducing effects.

J. J. Spengler

Duke University

### Notes

1. It is somewhat misleading to include in the category of wealth only economically scarce material objects. This practice is not objectionable when the time interval under consideration is very short, but it may be objectionable when the time interval is long. For as population grows, and even as Net National Product grows, material objects which have heretofore been economically free become economically scarce and therewith become classifiable as wealth. Yet production may have been contingent upon the presence of these elements even before they became scarce and had imputed to them a portion of the output. In other instances, of course, it is the extension of exploitation to inferior grades of resources that makes wealth of them. In view of what has been said, therefore, distinction may, on occasion, have to be made between increments in wealth attributable to productive effort and increments having their origin in newly generated scarcity. On some implications of "unpaid factors" see Meade [1952].
2. The stock of NWK is not absolutely fixed in amount. It is advisable, on the one hand, that elements susceptible of only slight increase be included. On the other hand, there are included elements which are exhaustible through use and nonrestorable after exhaustion (e.g., "capital energy", or "economically recoverable reserves of energy in the fossil fuels"). Thus, the

fossil fuels recoverable at near present costs amount to not more than three times the cumulative amount of energy that will (according to estimates) be consumed in the world in 1950-2000 [Putnam 1953, pp. 77ff., 115, 136, 145, 231-40].

3. Some but not all of these elements may have values placed upon them (e.g., land, minerals) whereas others may have their cost-saving effects reflected in the value of other agents whose income yield is higher in consequence (e.g., land with good transfer conditions will be worth more than similar land with poor transfer conditions because less of its gross yield will be absorbed by transportation costs).
4. S. Valavanis-Vail [1955, p. 217] estimated the contribution of technology to American income growth at about 8 per cent per decade. In the United States, between 1869 and 1928, Jacob Schmookler [1952] estimates, the increase in gross national product "reflected in roughly equal parts an increase in resources and an increase in resource efficiency." (Here the term resource stands for input.) He found "little or no evidence...to support the common belief that technical progress grows at an ever increasing rate". The annual rate of increase (in per cent) in output per unit of input was 1.09 for the economy as a whole; 1.11 in agriculture; 1.41 in manufacturing; and 2.49 in mining. Cp. also Bruton [1955], which came to my attention after I had finished this paper.
5. The quality of many of these agents has, of course, improved. Much reproducible wealth is superior to that which it has replaced, and much of a modern labor force is superior to that which went before. These improvements in quality, however, reflect improvements in applied knowledge which has been embodied in the agents of production.
6. H. J. Davenport [1918, p. 180] later put it this way: "With an increasing population, and an increasing relative scarcity of the products especially derived from land...there falls out, per capita, a smaller product in society to be divided, there goes to the landlords a larger and larger proportion of this more and more tragically inadequate total. The landlords gain by the general ill-fortune. Those classes disinherited of land are doomed to a double and compounded pressure of adversity. The land famine smites them with both edges of its sword."
7. Because, as was noted earlier, some of the elements included under NRW are exhaustible, it is often suggested that the use of these should be guided by a rate of discount which is lower than that obtaining in the market place and which therefore serves to slow down the current rate of consumption of these elements [Scott 1954].
8. In reality, of course, NRW often is less effectively used by countries characterized by population pressure and low incomes than by countries with higher income levels. E.g., see U.S.D.S. [1949, pp. 32-34]; UN [1952]; Putnam [1953, pp. 88, 101-102, 114, 227].
9. It is not here denied that societies may prefer to utilize some of their resources in the production of elements falling into class [II.B.1]. In fact, when welfare is defined in certain ways, such resource use is indicated. However, that which class [II.B.1] wealth produced is not usually treated as part of NNP. Furthermore, even if it were so classified, it could not continuously contribute to NNP in the degree that class [II.A] wealth does. Social and economic factors, ranging from a "lack of familiarity with modern banking and financial institutions and habits" to various forms of insecurity, are responsible for some of the importance attached to class [II.B.1] forms of wealth. "Complicated social factors have encouraged the

holding of assets and savings in the form of hoarded wealth, gold, silver, paper currency, etc." See UN (ECAFE) [1951, p. 7]. As R. Solo [1955, pp. 156-159] shows, although the bidding up of land values does not, as does the hoarding of precious metals, divert resources from the formation of productive wealth, the complex of conditions underlying the overvaluation of land is unfavorable to capital formation.

10. As noted above some would be disposed to argue that investment in personal capital (e.g., education, health), so important in modern societies, might well be included in [II.A.1.b] since it affects output similarly. IBRD missions have fixed at between one-sixth and one-third investment in social overhead as compared with investment in economic overhead capital. [Spengler 1954, p. 591].
11. See Scitovsky [1954]; Lerner [1953]; Meade [1952]. On the limitations to which the principle of balanced growth is subject, see Fleming [1955]; and on weaknesses in Scitovsky's favorable assessment of centralized investment planning, see Stockfisch [1955]. That the marginal rate of return on investment in the human agent appreciably exceeds that realized on nonhuman capital is suggested by Procter Thomson in his forthcoming *Educational Finance*, Ch. 2. That imbalance retards growth was noted already by Burns [1934, pp. 244ff.].
12. See *Resources for Freedom* [PMPC 1952, I, pp. 59-62; II, pp. 176-84]; Ackerman [1953]. The United States, of course, is dependent upon foreign sources even for some strategically important materials. Recently the Economic Counsel Board of Japan [*The Mainichi*, 1954] estimated that by 1965 that country would have to increase its exports at least 100 per cent above the 1952 level. Even so Japanese exports might not run much above one-tenth of national income.
13. The figures given here are derived from [PMPC 1952, II, p. 180]. Data presented by W. S. and E. S. Woytinsky [1953, pp. 315, 394, 455, 756] suggest that the value of primary production approximates at least three-tenths of that of world output. The value of minerals approximates about one-fifth of all primary production; that of mineral fuel, about two-thirds of all mineral production.
14. In agriculture real-estate improvements and equipment, expressed as a percentage of the value of land, approximated just over 30 in the United States in 1880 and 1922. The corresponding percentages in mining in 1880 and 1922 were 64 and 93; in manufacturing, 323 and 571; in steam railroads, 428 and 566; in a variety of industries 174 and 152 [Kuznets 1946, pp. 201-202, 213; 1952, pp. 118, 120, 122]. According to Black [1936, p. 209], in the United States in 1930 the value of agricultural property other than land approximated seven-tenths of the value of agricultural land. D. G. Johnson [1948, p. 734] estimates the percentage of agricultural income imputable to land in 1910-46 at between 31.9 and 35.4; the share of capital at 7.5 per cent; and the share of labor at between 57.1 and 60.6 per cent.
15. This amounts to a partial denial of the nineteenth-century version of Say's Law, the validity of which depended in part upon there being in an economy a sufficient degree of substitutability between any one category of productive agents and some other category [Fukuoka 1955; Eckhaus 1955; cp. Fellner 1951].
16. See UN [1951, pp. 35, 76]. In his review of this work Bauer [1953, esp. pp. 217-219] implies that the above estimates may somewhat understate actual savings rates.

17. See UN (ECAFE) [1951, pp. 9-11]; Clark [1952, pp. 5-6]. But see Note 18 below, on Latin America; and also *The Eastern Economist*, where investment in India in 1953-54 is put at somewhat above 7 per cent of national income, or below an estimated maximum of 8-9 per cent [*New York Times*].
18. According to UN (ECLA) [1953, pp. 24-28], gross investment (exclusive of working capital) in 1946-52 was 16.5 per cent of GNP, with 11.1 of the 16.5 representing net investment. Accordingly, the rate of capital formation exceeded 11 (and even 12) per cent of national income. Gross investment expressed as a percentage of GNP exceeded 20 in Venezuela and Peru in 1945-52; the corresponding rate for Argentina approximated 17; that for Brazil, 15; those for other countries, 10-14. In 1952-53 what amount to similar rates (but adjusted for foreign-trade balance) approximated 17 and 21 in the United States and Canada, and 26, 23, and 15 in the Soviet Union, Poland, and East Germany; they ranged between 2 and 30 in Free Europe, with a median value of 20 [JCER 1955, p. 16]. In the United States, Net Capital Formation/GNP was 0.6 of Gross Capital Formation/GNP in 1869-98, 0.68 in 1894-1923, and 0.38 in 1919-48 [Kuznets 1952, p. 155].
19. Phyllis Deane [1955, pp. 8-10] believes that gross capital formation somewhat exceeded the 4-5 per cent of gross domestic product suggested by Gregory King's figures for England and Wales in 1688. Domestic Net Capital Formation expressed as a percentage of NNP approximated 13.7 in the United States in 1869-1908; just over 8 in the United Kingdom in 1870-1913; under 3.5 in Sweden in 1861-70 and just under 7 in 1871-90; just over 10 in Denmark in 1870-1909; 8.3, 4.6, and 5.6 in France in 1853-78, 1878-1903, 1903-11; about 14 (exclusive of inventory change) in Canada in 1901-30. Thus only in Sweden do we find a rate below 5 [Kuznets 1955; Hoselitz 1955]. On effects of price revolution, see Hamilton [1952]. In a forthcoming study of the consumption function Milton Friedman questions the unqualified proposition that increases in inequality tend to augment the average propensity of a people to save. He speculates that this effect is associated, not with increases in inequality that are permanent, but with increases that, having their origin in transitory factors, are likely to be impermanent. It is increases of the latter sort that may issue out of economic development and associated increases in interclass mobility.
20. There must, of course, be a sufficient supply of finance to facilitate the distribution of savings since, irrespective of actual and potential savings rates, savings or resources cannot be effectively utilized by entrepreneurs unless they can obtain sufficient credit [Robinson 1952, pp. 80-87]. Finance appears to be in much shorter supply, other conditions being given, in underdeveloped than in developed countries, with the result that the national asset structures of the former are less liquid than those of the latter. The ratio of bank assets to GNP is much higher in developed than in underdeveloped countries [Spengler 1954, note, p. 593]. Furthermore, as Goldsmith [1955a] finds, the ratio of intangible to tangible assets tends to rise with economic development. Accordingly, "liquidity preference" must be satisfied in part in underdeveloped countries by investment in readily saleable tangible assets such as jewelry.
21. The converse holds true also [Kuznets 1955; Domar 1953, pp. 1-32]. Kuznets remarks that the ratio of net to gross capital formation may be lower in underdeveloped than in advanced countries because durable capital constitutes a smaller fraction of all capital in the former. Clark [1952, Nos. 2-3, pp. 2, 8, Nos. 4-6, pp. 4-6] suggests "that a country must be able to accumulate a capital stock of over 1,000 O.U. (i.e., Oriental Units) per head of population before it can begin to industrialise, but beyond that point its progress may be fairly steady per head." This figure implies a per capita income of perhaps 250 O.U. per year. Output per head approximated



191 O.U. in India in 1948-49, 322 in Japan in 1919, and 513 in Italy in 1914. Clark's figure is merely an indication of order of magnitude. See Section V in text.

22. According to Deane [1955] per capita income increased by something like one per cent per annum between 1688 and 1770 in England and Wales at which time population was increasing only about 1/4 per cent per year (population increased just over 1 per cent per year in 1760-1860). Kuznets [1954b] estimates that per capita incomes in many underdeveloped countries of today are "from about one-sixth to one-third of the per capita incomes of the developed countries a century ago". 28.
23. How great are the ill effects of basing capital allocation upon interest rates (actual or implied) which do not reflect the marginal rate of substitution between capital and other factors of production depends upon the circumstances surrounding the use of capital. The effects are greater on capital-use than on capital-supply, however, since the interest rate is much more important as an index of capital scarcity than as a determinant of the amount of saving. On the Russian experience see Grossman [1953]. On the wage question see Rottenberg [1953]; Bauer [1953, pp. 211-212]. On forces supposedly making for an increase in the propensity to consume (forces which are intensified in low-income countries by international media of communication) see Duesenberry [1949, pp. 25-28]; Nurkse [1953, Ch. 3]; Jewkes [1951, pp. 11-13]. Milton Friedman (see note 19 above) casts doubt upon the "demonstration effect" thesis, that the low propensities to save supposedly found in underdeveloped countries have their origin in the examples of absolutely high levels of consumption provided by high-income countries. See also Bruton [1955, pp. 329-330]. For an example of a high propensity to consume that was not even reduced by a redistribution of income in favor of profits and against wages see Sturmthal [1955]. 29.
24. See Bronfenbrenner [1955], and on rates of capital formation found in Eastern and Western Europe respectively, UN [1953, pp. 24, 47-48, 68-69]. 30.
25. Inflation has often accompanied sustained development. On the possible effects of inflation see Lewis [1954, pp. 160-160]; Axelrod [1954, pp. 334-338]; Rao [1953]; Bronfenbrenner [1953, pp. 209-218]; Pazos [1953]; Wallich [1951, esp. pp. 26-30]; Nurkse [1953, pp. 111-114, 117, 144-145]. On the effect of inflation on real depreciation and capital formation, see Domar [1953, pp. 10, 23]. 31.
26. See on this last point Balogh [1954, pp. 243-84, esp. pp. 268ff.]; Leontief [1953a, pp. 332-349]. Hicks [1953, pp. 128ff.] implies that foreign investment is strongly attracted to export-biased economies, of which Canada was an example in 1900-1913 when it attracted nearly as much investment from abroad as it provided from savings at home [Cairncross 1953, Ch. 3, pp. 41-42]. When an economy is export-biased, of course, its structure is somewhat complementary to the structures of economies importing its products. Data on foreign investment are given by Kuznets [1955]. Data presented by Clark [1951, pp. 512-513] indicate that foreign investment per head of occupied population is generally very much lower in densely populated countries with resources available for exploitation. See also Buchanan and Ellis [1955, Ch. 14-17]; Nurkse [1955, Ch. 4, 6; and 1954, pp. 744-758]. The balance-of-payments problem of an underdeveloped country is the inverse of that of a developed, capital-exporting country [Domar 1950, pp. 805-826]. Bruton [1955, pp. 330-335] shows, among other things, how an underdeveloped country must alter its technology and its consumption pattern in order to free itself eventually of dependence on foreign capital. 32.
27. What is possible depends on technological, economic, political, and social conditions, and on the nature and flexibility of a country's economic 33.



structure. What is compatible with welfare criteria depends upon the indices of welfare by which developmental policy is guided and by the willingness of the population (voluntarily or under such duress as the ruling elite can exercise) to sustain the austerity of living conditions, the hardships, and the costs which continuance of a high rate of development necessarily imposes on most of the population of an underdeveloped country. Cp. Bronfenbrenner [1953, Part I, pp. 93-104].

28. See papers by Lowe [1955] and Grossman [1955]. In the United States in 1920-45, urban development absorbed 23.6 per cent of capital goods expenditures, and in the 1920's over 30 per cent, nearly all of this being for housing and social overhead capital [Hartley 1950, pp. 12-15].
29. See Goldsmith's [1952, pp. 306-307] estimates and Kuznets' [1952, p. 118] estimate that residential fixed capital in the US comprised close to one-fourth of all fixed capital in 1880-1922. Concerning Britain see Cairncross [1953, pp. 5-6, 123, 167, 169, 203]. See also Bank [1953, p. 190]; Gayer [1953]; Clark [1951, pp. 486-494]. Nearly half the funds made available to British colonial governments for financing development in 1955-60 are for social overhead capital and related expenditures [The Times].
30. For lists of industries suitable for establishment in underdeveloped countries see Lewis [1950]. See also Bhatt [1954a, pp. 1251ff.]; Bohr [1954, pp. 157-166]; Bhatt [1954b]; Grosse [1955, p. 305]; Leontief [1953b]. In the United States in 1949 capital invested per production worker in manufacturing ranged between \$83,286 in petroleum and coal products and \$3,149 in apparel and products made from fabrics; the average for manufacturing was \$9,429 [NICB 1954, p. 316; also Bliss 1939, Ch. 3].
31. In the US about three-tenths of fixed capital has been invested in transportation and public utilities [Kuznets 1952, p. 118].
32. Actually, Kuznets found in 1879-1928 the ratio in mining averaged higher than that in manufacturing, but lower than that in the other main industrial categories. See his unpublished paper, "Capital-Product Ratio and Technological Change".
33. It is not our purpose to examine the incidence of particular manifestations of population growth (e.g., increments in labor force, in total population, or in number of households; changes in age composition; shifts in population from rural to urban situations) upon the demand for particular kinds of wealth, or to note what kinds of wealth tend to be formed in advance of population growth, and what kinds after growth has taken place. Empirical data confirm the expectation that, since the volume of savings is augmentable at any time only up to a point, when an increase in the incremental rate of population growth takes place, and with it an increase in population-sensitive capital requirements (e.g., residential construction, transport capital), there is relatively less capital formed to serve other needs. See forthcoming study by Simon Kuznets and Dorothy S. Thomas.
34. In the United States in recent decades about three-tenths of the nation's  $KW$  has been required for residential purposes; the fraction invested in agriculture and nonagricultural business was close to five-tenths in 1890 and to four-tenths in 1939. See Goldsmith's [1952, p. 307] estimate. For estimates of capital requirements based on requirements per worker see UN [1951, pp. 77ff.].
35. Expressed more accurately, the required value of  $a$  is  $(1/s) [(1+p)(1+y) - 1]$ . For refined accounts see Domar [1946]; Koo [1955, pp. 47-62]; also Spengler [1951].

36. A very detailed account of the sources of savings in the United States, together with annual estimates for 1897-1949, is given by Goldsmith [1955b]. The impact of increase in family size upon family savings is discussed by Brady [1955] and by Henderson [1950, pp. 267-298].
37. Kuznets [1952, p. 82] gives  $s$  a value of slightly below 0.18 for the United States, 1879-1944; and the Royal Commission on Population [1950, par. 182], one of 0.24 for pre-war Great Britain. At the 1951 meeting of the International Association for Research in Income and Wealth, F. Coppola d'Anna's estimates for Italy, 1860-1938, give values ranging between 0.2 and 0.17 for the ratio of national income to all private wealth; and P. Jostock's estimates indicate that national income in Germany and wealth in Saxony grew at the same rate in 1886-1911. Clark's [1940, p. 389] figures for 1913 indicate ratios of capital (exclusive of land and national debt) to national income, ranging from 3.5 in Austria to 5.85 in Argentina. Clark [1951, p. 503] also estimates the capital-income ratio to range from 4.73 in moderately low-income countries to 3.0 in high-income countries.
38. The ratio of fixed capital to output fell by more than half in transportation and public utilities in the United States in 1880-1938. In Surinam a drop of about one-sixth in the capital-output ratio as forecast while in Mexico in 1940-50 the ratio reportedly approximated 2.11:1 [IBRD 1953, p. 204; 1952, pp. 28-29; Bhatt 1954a, pp. 317-319]. A spurious rise in  $s$  may be noted when, as a country undergoes development, an increasing amount of its economic activities becomes commercialized. For income gotten from such activities is better recorded than income gotten from noncommercialized or subsistence activities, with the result that the progress of commercialization introduces an upward bias in income estimates.
39. Kuznets [1952, pp. 127-128] estimates that inter-industry shifts accounted almost wholly for the rise in the ratio of fixed capital to NNP between the 1870-80's and the end of the 1910's in the United States. The "rise in the intra-industry ratios in agriculture and the mining-manufacturing sectors was largely offset by the decline in the ratio in the transportation and the public utility sector". Cp. also Goldsmith's [1952, pp. 296ff.] data. Concerning the possible role of innovation see Weber [1954, esp. pp. 112-116].
40. Clark [1951, p. 503] suggests, however, that the ratio of  $KW$  to national income tends to rise, in the early stage of a country's development, from 4.27 to 4.73, and thereafter to decline to and below 3. Concerning the technological and other factors that have tended to make for the constancy of  $s$  see Bruton [1955, pp. 325-328].
41. See Leibenstein [1954, esp. Ch. 4-5; and 1955, pp. 343-370]. Only in these two works (which deal also with several of the points treated above) have population and capital growth received attention along the lines considered above.

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## TAPPERS AND TRAPPERS: PARALLEL PROCESS IN ACCULTURATION<sup>1</sup>

### I. The Problem

The purpose of this paper is to show how two cases of acculturation exemplify parallel processes of culture change, that is, cross-cultural regularities of function and causality, even though differences in outward form and substantive content are such that the acculturation might also be considered as convergent development.

As subsequent sections will show in detail, the Mundurucú of the Tapajós River in Brazil and the Northeastern Algonkians in Canada differed during pre-contact times in social structure, in the general nature of their culture, and in their cultural ecological adaptations. The first were tropical forest hunters and horticulturalists living in semi-permanent villages and given to warfare. The second were hunters of large migratory game and were loosely organized in nomadic bands. Despite these differences, however, both represented roughly the same level of sociocultural integration. That is, individual families were related to one another through certain supra-familial patterns--village activities in the one case and band functions in the other--but the local unit in each instance was politically autonomous.

Since this paper is essentially an illustration of methodology, it is important to stress that the concept of level does not classify cultures according to concrete and substantive form and content. Different cultures may be wholly unlike in their particulars in that they are the products of distinctive area histories or traditions and of local adaptations to environments. At the same time, the largest integrated and autonomous social units may be of a similar order of inclusiveness. While, therefore, similarity of level must underly formulations of cross-cultural regularities, such similarity alone does not at all imply typological identity. The aboriginal tropical forest Mundurucú and the sub-arctic Algonkian hunters were wholly unlike in most cultural particulars and in social structure, although both were integrated on comparable sociocultural levels.

They were alike, however, in the acculturative processes to which they were subjected and in the final cultural type which is now emerging in both populations. The processes were similar in the special manner in which outside

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1. The acculturational phenomena described in this article were apparently found among many, although not all, Northeastern Algonkians, including native groups of New England as well as Canada. Speck, Steward, and others have considered this problem for many years. They were also found among certain Mackenzie Basin Athabaskans, as Jenness has shown. A very comparable case of acculturational process was studied by Steward among the British Columbia Carrier. These cases will be cited in the concluding comparative section. The Montagnais are taken as our principal example because Eleanor Leacock studied them in detail from this point of view.

The Mundurucú of Brazil are analyzed on the basis of a year of field research by Yolanda and Robert Murphy during 1952-53. The research was conducted under the sponsorship of the Department of Anthropology, Columbia University, and was made possible by a Research Training Fellowship granted by the Social Science Research Council and the William Bayard Cutting Traveling Fellowship, awarded through the Trustees of Columbia University.

commercial influence led to reduction of the local level of integration from the band or village to the individual family and in the way in which the family became reintegrated as a marginal part of the much larger nation. The resultant culture type was similar in each case in that the local culture core contained the all-important outside factor of almost complete economic dependence upon trade goods which were exchanged for certain local produce and because the functional nature of local production, the family, and other features were directly related to this new element. The common factor postulated to have causal importance is a kind of economic activity--the collection of wild produce--which entailed highly similar ecological adaptations. While rubber production differs as greatly in particulars from fur trapping as the tropical forests differ from the sub-arctic barren-lands of Labrador, the result of the acculturative processes in the two cases was the independent emergence of the same type of culture, as defined in terms of level of integration and culture core. We shall use the latter term to denote the structural interrelationships of the basic institutions of the culture.

This case study should also help clarify the heuristic concept of cultural ecology, and especially to illustrate how fundamentally it differs from environmental determinism. It will be shown that total environment is in no way the decisive factor in the culture-environment relationship. In analyzing the creative processes in the adaptation of culture to environment, it is necessary to determine the crucial features in the environment that are selectively important to a culture of a particular level and a particular area tradition. In this sense, it does not matter how different the subarctic and the tropical forests are in their totality. The primary fact is that each environment afforded a resource for trade purposes which could best be exploited by individual families controlling these products within delimited territories. These products did not achieve importance until the native populations became parts of larger sociocultural systems and began to produce for outside markets in a mercantilist pattern.

The process of gradual shift from a subsistence economy to dependence upon trade is evidently irreversible, provided access to trade goods is maintained. It can be said, therefore, that the aboriginal culture is destined to be replaced by a new type which reaches its culmination when the responsible processes have run their course. The culmination point may be said to have been reached when the amount of activity devoted to production for trade grows to such an extent that it interferes with the aboriginal subsistence cycle and associated social organization and makes their continuance impossible.

## II. Northeastern Algonkians

Our discussion of the acculturation of the Northeastern Algonkians assumes that the family-owned fur-trapping territories widely reported among these Indians were post-white in origin. The supposition of Speck [1915; 1939; 1942], Cooper [1939], and Eiseley [1939; 1942; 1947] that such territories were aboriginal lacks support in early historical documents. Moreover, indisputable cases of post-white formation of family territories have been reported by Leacock among the Eastern Montagnais [1954], Jenness among certain of the Mackenzie Basin Athabaskans [1932, p. 257], and Steward among the British Columbia Carrier [1941]. Leacock's study [1954] deals with the processes of development of trapping territories in greatest detail and consequently provides the most illuminating material. We shall constantly refer to it in the following delineation of the aboriginal culture core and the subsequent changes in it.

According to Leacock, the Eastern Montagnais formerly possessed very loosely integrated bands. The basic aboriginal social unit was the "multi-family" winter hunting group consisting of two to five families. These groups were nominally

patrilocal, but there was considerable deviation from this pattern, and individual families readily shifted from one group to another [*Ibid.*, p. 34]. The continual splits and reamalgamations of these winter groups depended upon the vicissitudes of the subarctic Labrador winter. Game, never abundant or highly concentrated, became thinly scattered during severe winters. Families then had to break away from the winter multi-family group in order to exploit the country extensively. In better times, they might reassemble with a different group of families. While each of these groups had a leader, his following was ill-defined and fluctuating in membership.

Despite the frequent necessity for the winter group to split into smaller units, the Eastern Montagnais preferred to live in larger social groups, for collective hunting was generally more efficient for taking large game. Leacock's more conservative informants, in fact, regarded solitary or semi-solitary hunting as a white man's technique, and they expressly said that it was not appropriate for Indians. Moreover, in the absence of outside sources of food, which are available today, sharing of game was essential to survival since any family might be unlucky in hunting. The rigors of the environment necessitated a degree of social fluidity and amorphousness that was essential to physical survival. Owing to variations in environmental factors, especially in the quantity and distribution of game, crystallization of more rigid and permanent winter groups was impossible.

The Montagnais were, however, grouped into somewhat larger units during the summer season of fishing and caribou-hunting. Each summer, several multi-family winter groups gathered together on the shores of the lakes and rivers, where they could obtain fish in some quantity. These groups, according to Leacock, did not maintain ownership of well-defined territories in native times [*Ibid.*, pp. 14-15]. Each band had only a rough and generally-recognized territorial locus of operations. But it would have been contrary to the interests of any one band to encroach upon the lands of other bands; for band areas represented an approximate division of resources in relation to population. But since local availability of game differed each year, it was customary that a temporarily favored band offer hospitality to one that was starving.

These "bands" had little or no formal organization. There were no band chiefs or definite mechanisms for integrating the band as a social entity. The bands existed principally upon the basis of economic reality. They had greatest functional significance during the season of hunting large, migratory animals. While both the Montagnais and the culturally indistinguishable Naskapi hunted caribou, the relatively greater reliance of the latter upon caribou probably accounts for the stronger development of band hunting territories in northern Labrador.

Leacock divides the development of the family trapping territory into three general phases [*Ibid.*, p. 24]. In the first stage, when the Indians were only slightly involved in the fur economy, the trapping of fur-bearing animals and trade for hardware and food-stuffs was secondary to native subsistence activities. In this stage the Indians were only partially dependent upon the trader and could still subsist on the native economy. Since the small, nongregarious and non-migratory fur-bearing animals were not killed in great numbers by the more primitive techniques of wooden traps and firearms and since they yielded inadequate meat, the primary winter dependence was upon deer and other larger game. The Indians could devote themselves to the luxury of securing trade articles only after assuring themselves of an ample food supply.

These marginal trappers, however, rapidly became so involved in the barter system that certain western goods, such as pots, pans, knives, axes, steel traps, and firearms became necessities to them. Since these available manufactured articles were much more efficient than the corresponding native implements, the latter were rapidly displaced and knowledge of their manufacture was eventually lost. The basic process therefore was one of increasing dependency upon trade,

which eventually brought the loss of many useful arts. During this early stage of dependency, the customary use of ill-defined territories by amorphous bands was still the only approximation of land ownership to be found, and bonds of intra-group dependency were still tight.

In the second period of Montagnais acculturation, the same fundamental process continued to the point where certain basic readjustments became necessary. Dependency upon the trader increased to such an extent that fur trapping became more important than hunting for subsistence. The Indian was now forced to buy the major part of his winter's provisions from the trader, and game formed only a supplemental food source. Owing to the difficulties of transporting a supply of food adequate for the entire family, the men began to leave their families at the trading post during the winter while they trapped in the company of other men. Debt obligations and credit facilities had already linked Indians with particular trading posts. The practice of leaving families at the posts throughout the winter tightened these bonds. The families depended upon the store for subsistence, and the post became the center of the trapper's social world as well as economic world.

Leacock states that during this second stage, which is typified by the present day Natashquan band of Eastern Montagnais, there is still considerable territorial shifting of fur trappers and that family trap-line tenure is temporary and unfixed [*Ibid.*, pp. 30-32]. Older informants expressed a preference for collective activity, which is exemplified today by trapping in groups, lack of definite proprietary rights in trapping territories, and the sharing among the men of the trapping groups of the fur from animals shot with guns. That animals trapped were claimed by the trap owner is probably also native.

The stages outlined by Leacock, however, are not presented by her as clearly distinguishable periods during which cultural stability was achieved. They are no more than transitory phases, and the Eastern Montagnais are now, in our terminology, moving toward the culmination of the processes of change. Certain men, says Leacock, show an increasing tendency to return to the same trapping territory year after year [*Ibid.*, p. 30]. Within these more limited precincts, usually no more than two trappers can work together. To a certain extent, the example for this pattern has been set by the white trappers, but the Indians follow it primarily because it is the most efficient working arrangement. When a single Indian enjoys the yield and has a vested interest in the vital resource of his territory, he attempts to protect and perpetuate it by practices of fur conservation which were not native to the culture. The more conservative Montagnais trappers do not wholly approve of the new mode of work followed by their compatriots, but they respect their tenure of exclusive trapping rights to a limited region. What emerges is a system of ownership by usufruct, a system also found among the Western Montagnais and, in fact, in many other areas of the world in which controls of law and government are loose and population density is low.

As more and more Eastern Montagnais adopt this new exploitative pattern, the group as a whole increasingly acknowledges family rights to delimited fur territories. Such rights will extend over much if not most of this area, and it will undoubtedly encroach seriously upon the semi-nomadism of the more conservative Indians. Ultimately, these latter, too, will have to change. What finally emerges will be the classical family trapping territory system in which definitely limited tracts are held by the head of a family and inherited patrilineally.

In order not to confuse or oversimplify theories of the origin and development of property rights, it is important to recognize that rights to fur trapping territories mean merely customary or usufruct rights to the furs of animals within a defined area. They by no means give exclusive rights to control of and profit from the land itself and everything thereon or even to all its wild life. Anyone



may pursue and kill deer or caribou on any fur area. In some instances, another may kill and take the meat of a beaver, provided only that he give the pelt to the man having exclusive rights to the furs within the territory in question.

Two basically different concepts of rights to resources within the same area co-exist, each justifiable and explainable in its own way: the right to hunt large game for subsistence purposes practically anywhere and the right to monopolize fur-bearing animals within prescribed areas. In British Columbia the provincial government recognized these differences some years ago and registered family owned trapping territories of the Carrier Indians and protected them by law while permitting moose-hunting anywhere.

This end product of acculturation is substantially Leacock's third stage. The nuclear family now becomes the primary economic and social unit, and the old bonds of inter-familial economic dependency become attenuated. The new individualism has even penetrated the nuclear family. Among the Western Montagnais, the son of a trapper owns the beaver lodges which he discovers, whereas among the most acculturated of the Eastern group, only the family head may own such a resource.

With the breakdown in interfamilial ties among the Northeastern Algonkians, the economic centers of gravity for the families are the trading posts. Leacock says:

"The movement of trading posts has obviously been the most important factor determining recent shifts in the size and location of Montagnais bands. However, it would be wrong to infer from this that increasing dependence on trade has acted to destroy formerly stable social groups. The reverse seems to be closer to the truth--that the changes brought about by the fur trade have led to more stable bands with greater formal organization".  
[Ibid., p. 20]

Leacock gives the Seven Islands band as an example of this post-contact development. This new "band", however, is of a different order entirely than aboriginal hunting bands, for the principal bond between the members is that they all trade at the Seven Islands trading post. They claim no band territory; in fact, all present trends are towards familial tracts and not band lands. The modern band has a chief whose principal function is to act as intermediary with the Indian Agent. Also, the Indians refer to themselves as the "Seven Islands" (derived from the name of the trading post) people, and are so called by other Indians. In the interest of taxonomic clarity it is best not to describe such an arrangement as a "band". Such a group is reminiscent of the post-white Shoshoneans of the Great Basin, who classify themselves principally by reservation, for example, Warm Springs Paiute, Burns Paiute, Owyhee Shoshoni, and so forth. Prior to the Reorganization Act, the only basis for these groupings was common residence on a reservation and representation by a spokesman, who generally attained his position partly through prestige, but probably more importantly through recognition by the Indian Agent. Since the agents preferred "cooperative" men, the chiefs often did not truly represent the Indians. These reservation people, like Leacock's Seven Islands band, had little formal structure and a very limited *raison d'etre*. The stability of these groups is almost entirely a function of their linkage to the whites, an outside factor. Among the more acculturated Eastern Montagnais, the basic socio-economic unit appears to be the nuclear family.

### III. The Mundurucú

We shall discuss the Mundurucú in somewhat greater detail than the Algonkians not only because they are less known ethnographically but because the special

problem of acculturation toward individual families has not been adequately described for South America.

The Mundurucú have been in active contact with European civilization for the last 160 years, of which only 80 years have been spent in rubber exploitation. The following description of the pre-rubber period Mundurucú does not purport to depict the pre-contact, or aboriginal, Mundurucú, but refers to the middle of the nineteenth century. Earlier changes in Mundurucú culture form the subject of another paper [Murphy 1955].

The Mundurucú have inhabited the gallery forests and savannah lands east of the upper Tapajós River in the state of Pará, Brazil, for at least two centuries. The savannah in this region is quite limited, and the predominant flora are the high forest and thick vegetation typical of the Amazon basin. The Mundurucú chose the open country for their villages because remoteness from the larger streams afforded some protection from river-born enemy attack and relief from the swarms of insects which infest the river banks, while the absence of forests immediately adjoining the villages gave some security against the dawn surprise attacks favored by nearly all tribes of the region. These attacks were difficult to launch without cover. Since the Mundurucú used water transportation only slightly, isolation from the rivers was not a hardship.

It has been noted that the nineteenth century Mundurucú and Northeastern Algonkians were on the same level of sociocultural integration. The simple, loosely-structured nomadic hunting bands of the Algonkians were roughly equivalent to the semi-sedentary villages of the Mundurucú. In both instances, the local group consisted of a multi-family, autonomous community. Under certain circumstances, the various Mundurucú villages tended to integrate on a tribal level, but there were no permanent trans-village political controls. That no Mundurucú village could function in isolation, since there was inter-village marriage and periodic cooperation in warfare and ceremonialism, does not necessarily imply a higher level of integration in economic or political activities. Similarly, it can be argued that Northeastern Algonkian bands were autonomous but by no means isolated from other such units.

The Mundurucú and Algonkians were integrated on the same level, but their cultures differed structurally or typologically and in content. Patrilineal clans and moieties in Mundurucú society made kinship ties more extensive and pervasive. Village subsistence was based on slash-and-burn horticulture. Although the heavy work of clearing the forest was done by work groups consisting of all the village males, garden care and manioc processing were carried out by the women of the matrilocal extended family. The chief occupations of the men were hunting and warfare.

Leacock's reconstruction of the aboriginal society of the Eastern Montagnais shows the nuclear family to have had greater functional importance than among the Mundurucú. The Montagnais family was a relatively stable unit within the shifting and amorphous hunting bands, whereas the Mundurucú pattern was the converse. Each Mundurucú household was a stable unit composed of women and their female offspring. The Mundurucú had the seeming paradox of matrilocal extended families in a society of patrilineal clans and moieties. The men married into these extended families from similar units in the same village or from other villages. However, there was no need to integrate a husband into the extended matrilocal family of the household, because the focus of his activities was the men's house. All males upon reaching adolescence slept in the men's house, which was located on the western perimeter of the circle of houses composing the village. The females of each household prepared and sent food to the men's house to be eaten in a communal meal. The men's house was also the center of male work and relaxation. The most immediate economic tie of a man to his wife's house was that he brought his daily take of game there. Communal distribution of game, however, made this economically

unimportant. Otherwise, the husband visited his household for purposes of sex, to play with the children, or to take a between-meals snack.

Marital break-ups caused no great social maladjustment. The woman and her children simply lived on in the household and took another husband. If the ex-husband was originally from the same village, he did not even have to move his hammock from the men's house. The husband and wife performed no economic tasks together, and the sexual division of labor operated mainly within the context of the village as a whole rather than the nuclear family.

The yearly cycle of activity of the pre-rubber period Mundurucú was not patterned by warm and cold seasons as in Labrador, but by rainy and dry periods. At the end of each rainy season, April on the upper Tapajós River, the trees and vegetation in each projected garden were felled by a work party composed of all the men of the village and allowed to dry out. After clearing the forest, many families went in small groups to the larger streams where fishing was good during low waters and where they could hunt the many game animals which left the interior forests to feed and drink at the streams.

After two to three months it was necessary to return to the village to burn the felled vegetation in the garden clearings before the first rains wet the forests. After the early rains had sufficiently moistened the ground, individual gardens were planted to manioc by the cooperative efforts of all the men and women of the village. Other vegetables were planted by the women of the household of the man who initiated the gardens, and who was formally considered to own it.

Maize, squash, beans, and other vegetables were harvested by January or February and eaten immediately. The root crops, including bitter and sweet manioc, matured at the end of the rainy season in new gardens. A longer period of maturation was required for root crops in replanted gardens. Bitter and sweet manioc can be harvested as needed; this natural storage made these crops invaluable for year-around subsistence.

The bitter manioc, by far the most important garden product, required considerable labor to render it edible. The tubers were grated, the prussic acid was extracted by use of the *tipiti*, or basketry press, and the pulp was then toasted either in the form of the native *beiju*, a flat manioc cake, or of *farinha*, the coarse Brazilian manioc flour. *Farinha* was sold to Brazilian traders. All phases of manioc processing were carried out by the women of the extended family household, who worked together under the direction of the oldest woman of the house. The labor was divided according to specialized tasks which, however, probably contributed as much towards making the operation pleasant as efficient.

*Farinha* was thus a collective product in that it involved the communal labor of the village in garden clearing and manioc planting, and the efforts of the women of the household in processing. Moreover, it was sold to the traders by the village as a whole and not by individuals. In this barter the hereditary village chief represented the village, and the proceeds from the sale were divided equally among the contributing households.

Bates, the British naturalist, describes the mode in which this trade was conducted in the mid-nineteenth century, when the first small quantities of rubber were traded by the Mundurucú along with larger amounts of other produce:

"They [the Mundurucú of the upper Tapajós River] make large plantations of mandioca, and sell the surplus produce, which amounts on the Tapajós to from 3000 to 5000 baskets (60 lbs. each) annually, to traders who ascend the river from Santarem between the months of August and January. They

also gather large quantities of salsaparilla, india-rubber and Tonka beans, in the forests. The traders on their arrival at the Campinas (the scantily-wooded region inhabited by the main body of Mundurucú beyond the cataraacts) have first to distribute their wares--cheap cotton cloths, iron hatchets, cutlery, small wares, and cashaça--amongst the minor chiefs, and then wait three or four months for repayment in produce". [1863, pp. 243-244]

When rubber became the major product of Amazonia the same pattern of trade was perpetuated among the Mundurucú. All of the rubber collected was turned over to the chief, who alone negotiated directly with the trader. The merchandise given for the rubber was, insofar as could be ascertained through contemporary informants, equitably distributed to each man in proportion to the rubber he had produced. But since chiefs were commonly more prosperous than other men, it can be assumed that they did not suffer in their role of middleman. The share taken by the chief, however, was never so great as to result in truly significant wealth differences. In fact, the traders usually managed to keep the Indians in debt, and this debt was charged against the chief as the representative of the village. Tocantins, who visited the Mundurucú in 1875, published a bill presented to one chief [Tocantins, p. 154]. If this bill is typical, the Indians' indebtedness was frequently very heavy. These debts were used to force the chief to extract greater production from his followers.

As the Mundurucú depended increasingly upon trade, the chief became more subordinate economically to the trader, who manipulated him accordingly. The trader eventually was able to appoint "chiefs" to carry on the trade. An appointed chief was usually known as the capitao, or "captain", as distinguished from the hereditary village chief, who was called anyococucat or ichóngop. By using the "captains" as local trade representatives, the traders were able to increase their control over the villages. At the same time, by robbing the hereditary chiefs of their trade function, they weakened the entire structure of leadership. In time, the capitao displaced the hereditary chief almost entirely. To increase the prestige of the trader-appointed chief, the trader often took his protégé on his annual trip to buy supplies in Belem, where the chief's position was confirmed by the governor or some other official.

The Mundurucú dependency upon trade at first evidently increased the peacetime authority of the hereditary chief, for the villagers relied upon him to promote and secure their best interests in trading activities. The appointment of capitaoes undermined the native chief, and initially increased the trader's control over the village. The people became confused, however, as to whether the capitao or the anyococucat should be regarded as "chief". Ill feeling towards and suspicion of the appointed chiefs began to develop, for the Indians were always aware of, although powerless to cope with, the sharp practices of the traders, and they usually assigned the capitao a share of the blame. Upon the latter fell the onerous task of goading the people to harder work in the rubber avenues. Since most Mundurucú do not even today consider rubber collecting a congenial occupation, the role of the capitao must have done little to increase his popularity. During the field research among the Mundurucú, the young, bilingual trader-appointed "chief" of the village of Cabitutú was in danger of losing his life. Distrust of the trader, whom the "chief" represented, was centered upon this young man and threatened his position so greatly that he was on the verge of flight.

In later years, as will be described subsequently, individual Mundurucú Indians have tended increasingly to deal with the trader directly rather than through the "chief". For this reason, village political organization has been effectively shattered.

The white-appointed Mundurucú "chief", unlike his Northeastern Algonkian counterpart, mediated trade relations between a group of followers and the



whites. After individual trading had become strongly established among one section of the Mundurucu, however, "chiefs" were chosen by the Indian Agent and by missionaries in order to control the general behavior of the Indians, and not specifically for commercial purposes. This more nearly approximates the modern Montagnais situation, although it was reached through a different sequence of functional roles and from a different aboriginal base. In both cases, the Indians themselves were very conscious that these men were not genuine chiefs in terms of aboriginal leadership patterns, and both groups apparently suspected that the white-recognized chief was promoting the interests of the white men rather than those of his own people. The new leadership patterns never became fully established. While these patterns were functional in terms of white-Indian relations, they were dysfunctional in terms of the native socio-cultural structure.

Among the Mundurucu, therefore, the integrity of the local socio-political groups was, in part, temporarily maintained by a change in the functional role of the chieftain. That the changed pattern of leadership eventually became dysfunctional resulted in part from the ecological adaptations necessary to rubber collection. These adaptations, however, did far more than contribute to the disintegration of political controls. They undercut the very economic basis of village life.

Hevea brasiliensis, the native and most common specie of rubber tree, grows wild throughout the upper waters of the Amazon. It can be exploited only during the dry season, and, in the upper Tapajós River valley, the maximum length of the gathering season is from May to early December, approximately seven months. Since these trees are scattered throughout the low lands near the watercourses, they are reached by circuitous paths cut through the undergrowth. The spacing of the trees and the work involved in rubber collection generally limit the number of trees tapped daily by one man to one hundred and fifty or less. Some collectors improve their yield per tree by maintaining two or three separate avenues which they visit only every second or third day. The distribution of rubber trees is such that each avenue gives access to trees within an area of about three to five square miles. The actual size of this territory depends, of course, upon the density of the rubber trees. In some sections of the Amazon drainage wild rubber is more abundant than are others. One may travel ten to twenty miles on reaches of river where rubber is sparse without passing a single habitation, but, where rubber is more plentiful, one encounters houses at intervals of a mile or even a half-mile.

The rubber tapper must work in his avenue or avenues almost daily, and therefore must live near them. Since each tapper exploits a considerable tract of land, his physical remoteness from neighboring tappers is a matter of necessity. Thus, on the Tapajós River, which has a population of about 3,000 excluding the Mundurucu, there are only two Brazilian villages of any consequence. One of these has a population of about 700, and the other has only 150 people. The other settlements are merely hamlets consisting of a trading post and from two to seven houses. The majority of the population live in isolated houses on the river banks.

The exploitation of wild rubber is a solitary, individual occupation in that the tapping of the tree, the subsequent collection of the latex, and the final coagulation process are one-man jobs. The last phase, carried out at the end of the day, consists of solidifying the latex over a smoky fire. The simplicity and the daily time-schedule of the entire rubber process in Amazonia is such that no one can profitably leave off collection to specialize only in tapping or collection or coagulation. For similar reasons, two men do not work in the same avenue. However companionable, it would not be a practicable means of increasing production.

This brief account of how wild rubber is exploited is necessary to an understanding of changes in Mundurucu society. In the earlier contact period, the

Mundurucú traded chiefly in manioc flour and wild products, and rubber was of secondary importance. Chandless' observation [1862, p. 277] that in 1860 the Mundurucú of the upper Tapajós "trade in salsa and sell provisions to the parties of India-rubber makers" indicates that important trade in articles other than rubber continued at least until 1860. Shortly after this date, however, the tempo of rubber extraction in the Amazon quickened, and in 1875, as Tocantins' account shows [1877, pp. 151-154], rubber was the most important Mundurucú product.

With the advent of the rubber trade, Mundurucú acculturation entered its second stage. During the first, when trade in manioc flour and certain wild products predominated, the hereditary chief mediated between the traders and his people, aboriginal social patterns were largely unchanged, and warfare was still vigorously prosecuted, frequently under the sponsorship of traders and colonial authorities. During the second stage, which lasted until 1914, warfare abated, the size of villages decreased owing to migration and European-introduced diseases, and the position of the hereditary chief was weakened by the imposition of appointed "chiefs". The period was characterized by a "loosening" of integration rather than by a change in mode of integration, or structure.

Work in the rubber avenues in the latter half of the nineteenth century did not upset the annual subsistence cycle as much as might be expected. Whereas many people had formerly left their villages during the dry season to hunt and fish along the streams, they now left to collect rubber. As in times past, they cleared their garden sites before leaving and returned to the village in time to burn them over and plant. The necessity to provide all their own subsistence limited the rubber producing season to three months, mid-June to mid-September, out of a possible seven. This parallels closely the earlier phases of Northeastern Algonkian fur production, when the Indian's need to obtain their own meat supply by aboriginal cooperative techniques limited fur production and conflicted with their increasing desire for Western manufactures [Leacock 1954, pp. 25-26].

During the nineteenth century (and to the present day) the Mundurucú, like the Algonkians and in fact most aborigines, had been acquiring a seemingly insatiable appetite for the utilitarian wares and trinkets of civilization. Firearms increased their efficiency in warfare and hunting, especially the individual hunting carried on during the rubber season when one or two families lived in isolation adjacent to their rubber trees. In communal hunts, the game could be surrounded and the range and velocity of the weapons were not so crucial to success. Other items, too, became necessities to the Mundurucú. Contrary to popular belief that nudity is beneficial to tropical peoples, there are various reasons why clothing is desirable in the Amazon. Insect stings greatly annoy the Indians, and at night the temperature drops to from 55° to 65° F. Clothing, however, is expensive, and only in recent years has it been used consistently in some Mundurucú villages. The movement toward covering the body entailed the development within two generations of a sense of shame comparable to that of Europeans. The Mundurucú, especially the women, have also acquired a desire for finery for the sake of display. They have also developed a taste for many strictly non-utilitarian goods, such as the Brazilian raw cane rum and the beads and ornaments purveyed by the trader.

A full and adequate description of the growth of Mundurucú dependence upon trade would require a separate treatise, for reliance upon manufactured goods entailed further dependence upon many adjuncts of these goods. For example, firearms required powder and lead, while garments of factory-woven cloth had to be made and repaired with scissors, thread, and needles. The substitution of metal pots for native ones of clay and of manufactured hammocks for the native product has reached the point where many young women now do not know how to make these articles. The Mundurucú barely remember that their forebears used stone axes and bamboo knives, and they would be helpless without the copper toasting pan used to make manioc flour.

Despite the flourishing trade in gewgaws, the allure of most trade goods lay more in their sheer utility than in their exotic qualities. The increased efficiency of the Mundurucú economy made possible by steel tools must have been enormous.

The parallels in these basic processes of acculturation between the Mundurucú and the Montagnais are probably to be found also among most aborigines. In the case of the Mundurucú, the displacement of aboriginal crafts by commercial goods better suited to meet local needs, both old and new, inexorably led to increased dependency of the people upon those who furnished these goods and therefore to a greater involvement in economic patterns external to their own culture.

The Mundurucú families, like those of the Algonkians, became dependents of the trading posts. More than a century ago, Bates related that Brazilian traders made seasonal expeditions to trade with the Mundurucú. After rubber became important in the Amazon, permanent trading posts were established on the upper Tapajós River. These posts, whether owned by individuals or companies, exercised such control over tracts of rubber-producing forest that they compelled the rubber collector to trade exclusively with them. They accomplished this by their power of dispossession and by holding the collector in debt. The traders among the Mundurucú were never able to obtain title of ownership to the rubber regions within Mundurucú country proper,<sup>2</sup> but they made the Indians dependent upon them in a very real sense through their credit arrangements. In time, all of the Mundurucú villages came under the control of various traders, who were so influential by virtue of being necessary to the Indians that they were able to appoint the "chief", in violation of Indian tradition, and thereby intensified their control over the Indians.

The progressive weakening of the hereditary chief, whose authority was based upon aboriginal activities, was furthered by the decline in warfare. The post-white warfare, although frequently mercenary in character and auxiliary to Portuguese occupation and expansion, continued the native pattern of authority. The Indians were paid in trade goods. When, at the end of the nineteenth century, the central Amazon region had been pacified, the military help of the Mundurucú was no longer needed. Meanwhile, rubber collecting had become the principal means by which the Indians acquired foreign trade articles. Since the Indians were important to rubber production in labor-starved Amazonia, they were pushed to greater efforts by the traders. Increased devotion of the Mundurucú to rubber production correspondingly interfered with their warfare; for in earlier times the rubber season was the time for war. When in 1914 a Franciscan mission was established in their midst, the earlier political and economic basis of Mundurucú warfare was so undermined that the admonitions of the priests that they live in peace were quite effective.

At the end of the second stage of Mundurucú acculturation, only bonds of kinship and economic collectivity in producing food for the group held Mundurucú society together. Much of the old structure was gone. The chieftaincy had been undermined, warfare had ended, and reliance upon the outside economy was taking effect. During the nineteenth century, increasing numbers of Mundurucú who had difficulties with their co-residents were able to leave their villages permanently. Many others left in order to participate more fully in the rubber economy.

Full dependency upon rubber collection is not compatible with village life. Since the aboriginal Mundurucú villages were located several days foot travel from the rubber areas fringing the rivers, a family participating both in collective village life and the rubber economy had to migrate seasonally between its village and its house in the rubber area. Families living in this manner could spend only three to four months in rubber production. The only way the Indians can devote their full efforts to rubber tapping is to leave the villages of the interior savannah and live permanently near the rubber trees along the river banks. A large

portion of the Mundurucú, whose increased need of and desire for trade goods could no longer be satisfied by the yield of only three months' work in the rubber avenues, have made this choice.

These families represent the third stage of Mundurucú acculturation. Their resettlement in the rubber regions, however, has occurred in two ways. The first is a direct and complete adaptation to rubber collection, which can be studied in many contemporary inland villages. People desiring to increase their income from barter improve their rubber avenue house to make it more comfortable during the rains, plant gardens, and remain there. Although they maintain relationships with the inland villages, the loci of their social lives lie increasingly within the orbit of the communities of scattered families dependent upon the trading posts. The final step in their incorporation into the local Brazilian economy and the culmination of this acculturative process will come when they abandon horticulture to devote full time to work in the rubber avenues, and, like their Brazilian neighbors and the Western Montagnais, depend upon trade for the bulk of their food supply.

The second mode of readaptation to the rubber economy, while ending in the same type of settlement pattern and social organization as the first, involves passage through an intermediate stage. The previously mentioned mission on the Cururú River had indifferent success in attracting the Mundurucú until the 1920s, when a policy of trading with the Indians was adopted. The missionaries were honest and generous in their commercial relations, and rubber-tapping became more profitable to the Indians. Their intensified collecting activities resulted in a general movement to the banks of the Cururú River, and by the 1930s many interior villages had been abandoned.

The migrants settled so heavily on the river banks that they were able to nucleate in new villages. These villages, however, lacked the men's organization, division of labor, and collective patterns which structured the old type villages. Although the population shift from the old to new villages was heavy, it involved individual families rather than whole villages. The new villages grew as additional nuclear families arrived from the savannah communities. During this period of growth, since the new villages consisted of families, many of which had not previously been connected with one another, each family had to carry on the subsistence activities which were formerly the function of the extended family and village. Gardens were cleared and planted by husband and wife with whatever aid their children were capable of giving. Fish, taken by family members from the nearby rivers, rapidly replaced game formerly taken in collective hunts as the major source of protein. Meanwhile, increased rubber production enabled the Indians to buy the hooks, lines, and canoes with which fishing was made more effective. As the new villages grew larger, the atomistic division of labor was perpetuated, and the nuclear family became the basic unit of production.

Political authority on the Cururú River was almost nonexistent. The migrants began to trade as individuals, first with the missionaries and later with the newly established Indian Post. This economic trend stripped the "chiefs" of one of their last remaining functions, and their role was reduced to that of intermediary between the villagers and the priests and Indian agent.

The amorphously structured villages which arose on the banks of the Cururú River represent a transition to the family level and are not the culmination of adaptation to the ecology of rubber collection. Most of the residents of the Cururú River still have to reside away from their villages during the rubber season, but the easy communication made possible by canoe transportation allows the majority to return to rubber production after planting their gardens.

The new individualism and fragmented division of labor, combined with facets of the old culture which had become dysfunctional in the new situation, contributed



to the disorganization of Cururu River society. The political authority of appointed "chiefs" was now a means of extending the influence of the whites. The continuing migration of young men from the remaining primitive villages of the savannahs caused an oversupply of men on the Cururu River, and conflicts over women became rife. Owing to the endless squabbles in villages which had lost their aboriginal basis of integration, dissidents moved off to live at their rubber avenues or formed new and smaller villages. This fission process is still going on. Concomitantly, the Mission and the Indian Post are becoming more important as focal points in a new mode of integration of the Mundurucu. Over one-third of the Cururu River population make their rainy season homes at these agencies, which serve as centers of trade and of social and religious gatherings. It is from the Post and Mission, also, that the lines of authority now radiate.

#### IV. Comparative Summary

The accompanying table and chart present the major phases of acculturation in summary form, as abstracted from the historical continua. The basic acculturative factors in both cases exerted parallel influences, although the two societies were substantively different until the final culmination was reached. There were four causal factors common to each. First, both became involved in a mercantile, barter economy in which the collector of wild products was tied by bonds of debt and credit to particular merchants. Such involvement also occurred widely among native peoples who produced crops or livestock. This arrangement must be distinguished from cash transactions, in which, owing to the impersonality of money as a medium of exchange, the primary producer has greater freedom of choice as to with whom he will deal. In a pure credit-barter economy, all transactions are based on a personal relationship between the principals; the merchant must be able to rely upon the continued patronage of the primary producer whereby the latter liquidates past debts while assuming new ones. It seems to be a basic procedure that the pre-literate Indian is kept in debt by the trader. While the latter can manipulate accounts at will, and no doubt is frequently guilty of malfeasance, he usually allows the Indian to buy beyond his means. The debtor-producer is selling his future production, and the creditor will not extend payment unless assured of delivery. Where such an economy is found, it is common for merchants to refuse to deal with primary producers who are in debt to another merchant. This is a "gentleman's agreement" in the Amazon, although it is frequently violated by wandering traders. Second, the growing ties of dependency upon the traders are at the expense of collective bonds within the respective societies. Reliance upon individuals and institutions outside the native social system are intensified by a steady increase in demand and need for manufactured goods. This, as we have seen, goes beyond the mere initial allure of Western tools and ornaments. Luxuries soon became necessities--a process that can be found in our own culture. Third, while crude latex and animal furs are very unlike articles, they imply a common cultural-ecological adaptation. Both are natural products having a reliable occurrence in worthwhile quantity within an area which can be most efficiently exploited by one man. Both require conservation, for careless exploitation can seriously reduce the number of furbearing animals, or render rubber trees worthless. The producer has an incentive to maintain the productivity of his resources. Finally, both rubber tress and fur animals are sufficiently dispersed to require that persons exploiting them live or work at some distance from one another.

These factors of change were essentially the same among both Mundurucu and Montagnais, and they were introduced through contact with the outside world. Their initial effects upon the aboriginal cultures were somewhat dissimilar, owing to aboriginal differences between the two groups. Whereas the Mundurucu chief served at first as intermediary with the trader, this seems not to have been true of the Montagnais chief. Montagnais family heads, however, traded on behalf of their sons. For a short time, this pattern was followed by many

Tabular ComparisonMundurucú

## 1. Pre-rubber

Village consists of men's house, matrilineal extended family households; population divided into patrilineal clans and moieties. Village males form collective hunting and garden-clearing group. Household females form the horticultural unit. Intensive warfare for headhunting and as mercenaries allied to whites; partial dispersal of villagers in dry season for fishing and war. Chief the war leader and representative of village in trade of manioc flour.

## 2. Marginal involvement

Chief continues as mediator with trader, but is now often trader-appointed--trader gains influence. Dry season population dispersal for rubber production rather than fishing and war--war continues, but lessened in importance. Basic pre-rubber economy and settlement pattern unchanged. Continuing displacement of aboriginal crafts.

## 3. Transitional

Further displacement of native crafts, increased need of trade goods, increased dependence on trader. Chieftainship undermined due to new type chiefs who now represent the trader. Agricultural cycle and village life inhibit larger rubber production. Trend toward individual trade.

## 4. Convergence and culmination

## A. Intermediate

Move to new villages in rubber regions. Chief now intermediary with Indian agent and missionaries. Individual trade, individualized subsistence economy--end of men's house and traditional village--

Montagnais

## 1. Pre-fur

Nomadic composite band hunts large migratory game animals. Frequent band breakup during winter scarcity. Amalgamation of several winter groups for summer hunting and fish-fishing. Chieftainship weak and shifting--leader of winter group; no summer band chief. Residence bilocal, frequent shifts of winter group membership.

## 2. Marginal involvement

Trade by family heads--leaders do not trade for followers. Trapping secondary to subsistence hunting--subsistence still gotten traditionally, basic social patterns persist. No trapping territory. Linkage to trading posts.

## 3. Transitional

Further displacement of native crafts, increased need of trade goods, increased dependence on trader. Increased fur production interferes with subsistence hunting. Individual trade conflicts with group solidarity.

## 4. Convergence and culmination

Fur trapping now predominant; winter provisions purchased. Winter groups not necessary with end of collective hunt--family or individual hunting gives greater efficiency, allows conservation. Shift of economic interdependencies from group to trader.

Mundurucú  
(cont.)

village held together only by weakening kin ties and sociability.

Centripetal factors (e.g., sorcery, sexual rivalry) cause fission of these villages and results in B, below.

B. Dispersal (follows upon 3 or 4A)

Leadership no longer integrative.

Individual trade undercuts kin obligations.

Conflict with agricultural cycle resolved by moving to rubber avenue--family now in isolation except for trade bonds.

Montagnais  
(cont.)

Emergence of a chief who serves as intermediary with Indian agents and missionaries.

Nuclear family basic unit at all times of year.

Trapper maintains and transmits right to a delimited hunting territory exploited only by his family.

Mundurucú during the period immediately after the Mundurucú chief had ceased to act as intermediary with the trader. After the breakdown of extended kinship bonds in both groups, individuals traded completely on their own.

The native kinship organization persisted longer among the Mundurucú than among the Montagnais, and this has been a factor in perpetuating village life today among the less acculturated Indians east of the Tapajós River. Aboriginal Mundurucú kinship structure was more extensive and socially integrative than that of the Montagnais. Moreover, the aboriginal production of subsistence crops survives even among Mundurucú families living in isolation in their rubber avenues. The Mundurucú still produce all their own subsistence, although there are some changes in emphasis, technique, and organization.

The Brazilian rubber tapper--the white man who has gone into the forest or the Indian of mixed blood who is completely acculturated and enmeshed in the mercantile economy--usually buys all his food from the trader and devotes the season when he could be growing his own food to tapping rubber or to working off his debt to the trader by performing personal services. At present, we know of only one case of a Mundurucú who bought most of his food, but we can confidently predict that, as the population becomes more acculturated toward dependency in all ways upon the larger society, an ever-increasing number will buy food. When they are no longer able to feed themselves by their own efforts, they will have effectively become caboclos, or neo-Brazilian backwoodsmen.

The acculturative factors operated in two somewhat different ways among both the Mundurucú and Montagnais. First, they created a succession of modifications in the native societies, which gradually converged toward typological identity in the final family level. Second, during this evolution of the total groups they produced deviant families which broke away from their fellow tribesmen to devote themselves entirely to tapping or trapping. It was not until the processes had nearly reached their culmination that the surviving but greatly modified native society began to disintegrate.

Among the Mundurucú the bonds of leadership and kinship had undergone a steady and slow attrition during one hundred years. The end of warfare had robbed Mundurucú culture of a great deal of its vitality, and the chief was reduced to a mere figurehead, manipulated by the trader and the religious and governmental agencies. Work in the rubber avenues and dependence upon the trader had served to sever and weaken ties within the society. At the final point of transition to isolated residence, and total divorce from traditional communal life, the Mundurucú were not much more closely integrated than the Montagnais.

The culmination of the long acculturative processes shows a high degree of structural parallelism. Both Mundurucú and Montagnais populations are divided into loosely integrated and dispersed communities centering about particular trading posts with which the individual families have ties. The Indians still recreate, associate, and intermarry with one another, but the nuclear family is now the stable socio-economic unit. It is the highest level of integration found among the native population itself, but it is linked to the nation through the intermediary of a regional economy. The integration of the family with the national level is highly specialized and limited. These families do not yet share a substantial part of the common denominator of the national culture or even of the regional sub-cultures of their non-Indian neighbors.

There is a final phase, which, though occurring at different dates in the different localities, is characterized by assimilation of the Indians as a local sub-culture of the national sociocultural system and virtual loss of identity as Indians. At this point, the acculturational processes and results diverge, since the Indians participate to a much greater extent in the national culture. So long as the families maintain their marginal relation with the national society, they are quite unlike the basic populations of the nations in which they lived and much more like one another. When, however, they learn the national language, intermarry extensively with non-Indians, and acquire many of the non-Indian values and behavior patterns, they have to be classed with the special regional sub-cultures that have developed in portions of these nations.

It can be predicted that the drastic shift in mode and level of integration will do much to hasten the loss of cultural distinctiveness. Fortes has cogently expressed the relationship between social structure and formal culture content in such a situation:

"I would suggest that a culture is a unity insofar as it is tied to a bounded social structure. In this sense I would agree that the social structure is the foundation of the whole social life of any continuing society....The social structure of a group does not exist without the customary norms and activities which work through it. We might safely conclude that where structure persists there must be some persistence of corresponding custom, and where custom survives there must be some structural basis for this" [Fortes 1953, pp. 22-23].

#### V. Further Comparisons

We can delimit and refine the Mundurucú-Algonkian parallel by the cross-cultural examination of structural changes caused by acculturation in other areas. We will not seek further parallels, however, but will discuss cultures in which divergence appears manifest. One instance of such apparent divergence is the Northwest Coast, where the fur trade at first strengthened or intensified rather than weakened the aboriginal social structure. The florescence of the potlatch and class system on the Northwest Coast as a result of new wealth in trade goods is a thesis which has been ably expounded by a number of students [cf. Barnett 1938; Drucker 1939; Collins 1950; Codere 1950]. It would be very misleading, however, to consider any trade in furs as the crucial factor. What really matters is individual trapping of fur-bearing animals. The sea otter was the principal fur bartered by most Northwest Coast tribes, and collection involved neither individual effort nor delimited territories. The amount of land trapping was probably fairly limited and in any event did not offset the cultural effects of the great salmon wealth which created surpluses rarely if ever paralleled by hunting, gathering, and fishing people.

The trapping activities of the Skagit of Puget Sound more nearly paralleled those of the Northeastern Algonkians, according to Collins description [1950, p. 335]:



"The [trading] posts played an important part in altering the economy of the Indians. First, they encouraged a shift in their hunting habits. The skins in which the traders were most interested were beaver and land otter. These animals had small value in the aboriginal economy, since they were less desirable for food than deer or elk, for example. At the traders' behest, however, hunters pursued these animals eagerly. Another economic shift took place when the hunters, instead of killing game for meat, began to exchange skins for food."

The result of this trade was, however, quite different from its effects in Eastern Canada.

"The effects of these changes upon Skagit social organization were pronounced. Distinctions in social rank began to be more marked--a shift made possible since, though social mobility had always been within the grasp of any person of good descent who could acquire the distinction of wealth, new sources of wealth were now available" [Ibid., pp. 337-338].

The new wealth acquired by the Skagit was funnelled into the class structure and ultimately the potlatch. The difference, then, between the processes of change which occurred among Northwest Coast and Northeastern Canadian groups is that the former integrated the new wealth into a pre-existent class structure created and perpetuated by a fishing economy. Among the latter, since there were no cultural means or goals promoting the concentration of surplus wealth in the hands of a select few, the benefits rebounded to all persons. The same was true of Mundurucú society which also was unstratified. The differences between the Skagit on one hand as opposed to the Mundurucú and Montagnais on the other are attributable to the stratification of society among the former, which in turn is partially explainable by the greater aboriginal resources of the Skagit. In effect, this constitutes a difference of level of socio-cultural integration.

The impact of trapping upon a pre-existing social structure can be even better appraised among the Carrier of the interior of British Columbia, where the wealth in salmon was far less than on the coast. The fur trade among the Blackwater River Carrier involved intimate interaction with Northwest Coast groups, especially the Bella Coola. Goldman summarizes the effects of this contact upon the simple, bilateral Carrier hunting bands [1941, pp. 416-417]:

"Undoubtedly the Bella Coola, like all Northwest Coast tribes, became relatively wealthy as a result of this trade. And in Bella Coola where wealth was the decisive factor in building rank, the fur trade must have been particularly welcome. And the lowly interior Carrier who hunted for furs in order to trade with the Bella Coola, who traded them to the whites, became an important part of the scheme of elevating one's rank. Although a Bella Coola did not gain valuable prerogatives from a Carrier son-in-law, if he could get a monopoly upon his furs he could make enough wealth to purchase new prerogatives. And as the Bella Coola benefited by this trade, so did the Alkatcho Carrier. The latter took up products obtained on the coast and traded them to the Carrier villages eastward on the Blackwater River drainage. As they obtained guns and steel traps, economic productivity spurred so that they were able to build up the necessary property surpluses for potlatching. Potlatching obligations in turn stimulated economic activity, and the degree to which they were able to potlatch made possible the full integration of crests as honorific prerogatives.

Given our previous hypotheses, developments more or less parallel to those in Eastern Canada might be expected. But these Carrier did not trade with European traders; they dealt instead with stratified Northwest Coast tribes in the context of an economic system, the rationale of which was the validation of rank by potlatch. As the following example of the Stuart Lake Carrier suggests,

direct trade with the whites and the end of potlatching result ultimately in the family trapping territory system.

The effect of the fur trade among the Carrier of Stuart Lake to the north of the Blackwater River ran a similar course but culminated in family trapping territories, according to Steward's research. In pre-white times, the wealth of salmon fisheries, although far less than those of the coastal tribes, had provided some surplus, while contacts with the Tsimshian of the Skeena River had introduced a pattern for channeling this surplus to nobles who controlled the fishing rights of large territories in the name of matrilineal moieties. This wealth circulated through small-scale potlatches. The fur trade, carried on directly with the whites more than through coastal contacts, created a new source of wealth and intensified the native pattern. Although furs were trapped by individual moiety members, a noble had rights to certain percentage of the furs taken in his moiety's territory.

In the course of about 50 years, however, several processes combined to bring about individual trapping territories as among the Indians of eastern Canada. Most importantly, the new wealth in trade goods brought hardward that was of value to individuals. Pressures mounted to force the nobles to divide the trapping territories among their own children rather than to pass them on intact to their sister's sons, who had traditionally inherited their titles and rights. This process was aided by the activities of the Catholic missionary-ethnologist Father Morice, who effectively undermined the native religious sanctions of the class of nobles, and by the government, which banned potlatching. The older pattern survives only in isolated localities, where it is carried on clandestinely. At Fort St. James on Stuart Lake, where there is located a Hudsons' Bay Trading Post and some few hundred whites and Indians, the processes have reached a culmination almost identical to that of the Montagnais.

"Present-day Carrier society at Stuart Lake consists of individual families that have exclusive rights to certain trap-lines that are registered with and protected by the Provincial Government. The family is the kinship and economic unit" [Steward 1941, pp. 500-501].

It seems likely that the Blackwater River Carrier have not yet reached the final stage of acculturation. The same may be true of the Skagit. The critical consideration is whether wealth in salmon among these tribes was so great that it offset the importance of trapping. This was not the case at Stuart Lake. On the lower Skeena River, salmon are so important that canneries have been built, and the Tsimshian and Tlingit have given up fur trapping to become commercial fishermen and cannery laborers.

Certain Plains Indians in North America also engaged in the fur trade but developed in distinctive ways. This is another illustration of the need to examine specific features in the taking of furs. There is a significant ecological difference between the collection of fur on the Great Plains and in the coniferous forests of Canada that lies essentially in the difference between hunting and trapping. It is incomplete and misleading therefore to make comparisons simply on the basis of "fur trading". In the Great Plains, buffalo hides were the chief item traded, whereas in eastern Canada, small, non-gregarious and non-migratory animals were trapped. The trade on the Plains resulted in an emphasis upon the buffalo hunt beyond the needs of subsistence and served to strengthen the collective and cooperative techniques traditionally used in the pursuit of migratory herds. Moreover, band cohesion in the Plains was enhanced by acquisition of the horse and gun and by intensification of warfare, the latter carried on in part to obtain horses.

It is possible that a non-stratified society which acquires surplus wealth may develop a class structure, but this involves special conditions not ordinarily

found among collectors of wild products. Some of the North American Plains Indians showed an incipient development of a class society in the late eighteenth and early nineteenth centuries, but the tribes were decimated by epidemics and overwhelmed by the advancing frontier when intensified wealth and significant prestige differences had begun to emerge. A parallel between the Plains and the Mundurucu can be found in the increased authority of chiefs owing to their functions as intermediaries between the traders and the Indians. Jablow notes such a florescence of political controls among the Cheyenne [1951, p. 86], and Lewis specifically states of Blackfoot trade [1942, p. 42]:

"In periods of monopoly [of the Indian trade by one company] the fur trade has a positive effect, that is, it increased the prestige and authority of the chiefs. In periods of competition it has a disruptive effect, that is, it weakened the power of the chiefs."

The Plains band chief traded a commodity which was obtained by collective effort. The Mundurucu chief served as middleman in the pre-rubber period when trade in manioc flour, which was also communally produced, was of primary importance. But he eventually lost his position when individually produced rubber became predominant. The Tenetehara Indians of northeastern Brazil have been in contact with civilization longer than the Mundurucu, but, according to Wegley and Galvao, the village chiefs and extended family heads still have a central role in the trading of collectively produced manioc flour and palm oils [1949, pp. 26-30]. It seems apparent that, lacking some other basis for political authority, it is difficult for leaders to maintain control over trade in individually-produced goods.

Our formulations, in effect, state that when certain acculturative factors, defined functionally rather than formally, are present, the core of a culture will change in expectable and predictable ways. These formulations assume the constancy of certain other preconditions, which, though well worth investigation of themselves, can be regarded as given factors for methodological purposes.

This can best be exemplified in our present cases by reference to the basic, though incompletely explained, acculturative factor common not only to the Mundurucu and Naskapi but to most primitive peoples throughout the world. This factor can be stated simply as follows: When goods manufactured by the industrialized nations with modern techniques become available through trade to aboriginal populations, the native people increasingly give up their home crafts in order to devote their efforts to producing specialized cash crops or other trade items in order to obtain more of the industrially made articles. The consequences of this simple though world-wide factor are enormous, even though they vary in local manifestation. The phenomenon is of such a high order of regularity that special explanations must be sought for the few departures from it.

The main hypothesis arising from the present study is that: When the people of an unstratified native society barter wild products found in extensive distribution and obtained through individual effort, the structure of the native culture will be destroyed, and the final culmination will be a culture type characterized by individual families having delimited rights to marketable resources and linked to the larger nation through trading centers. Tappers, trappers, and no doubt other collectors come under this general statement.

Robert F. Murphy

University of California  
Berkeley

Julian H. Steward

University of Illinois

### Notes

2. The tenuous and diverse legal rights of the traders to control of rubber areas has been discussed by Wagley [1953, pp. 91-92].

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## THE ROLE OF COTTAGE AND SMALL-SCALE INDUSTRIES IN ASIAN ECONOMIC DEVELOPMENT\*

Ever since World War II, development plans in the scantily-industrialized countries of Asia have stressed the rapid introduction of powered industry, preferably large-scale. Whether or not the capital and other necessities are available, modern mechanized industry has been regarded as the trade-mark of a strong and advancing nation. It is therefore significant that even though many handicrafts are dying out in Asian countries under the impact of machine-made goods, government planners and administrators are now trying to revive and improve some of them.

In Asia, six types of handicraft and small-scale industry can be identified, based on organization, location, and markets. An analysis of these six types, against the background of post-war conditions, leads to a more systematic understanding of the economic pattern and problems of development peculiar to the area.

### I. Basic Terms Defined

The basic terms are used in various ways in the several countries of Asia. In a series of meetings sponsored by the ECAFE from 1951 to 1953, specialists and government officials concerned with cottage and small-scale industries were unable to agree on definitions, largely because conditions of production differ from country to country [ECAFE 1952b, pp. 2-4; 1953a, pp. 73, 81]. The basic terms defined below are those of the ECAFE, but the definitions are expanded to include features of ownership and location.

A cottage industry is carried on in the home as a part-time occupation primarily by members of one family using human or animal power. The products are for household or local village use and have little commercial importance.

A handicraft industry has more value or appeal by reason of highly developed art or complicated processing. It is usually carried on full-time in a separate shop by family members and outsiders together who have gone through an apprenticeship, and who make objects of art, ceremonial, and decorative use. These sell in limited markets, but the markets may be spread out over considerable distance. Such intricate craft industries cluster in political and trade centers where buying power is high: Kyoto, Peking, and Agra are ready examples.

A small-scale industry operates with hired labor, usually 50 workers or less on hand power, or not over 20 workers using motive power. (Classifications differ among countries on the basis of size of working force, size of power unit, or amount of capital. Such classifications are important for purposes of labor welfare laws, loans, and tax purposes where such legislation exists.) Considerable division of labor and assembly-line production permit scattering of such units as feeders into, or from, a central supply or processing plant. The major

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advantage of this type is the cheap labor and small capital equipment costs, such industry being found both within and on the fringe of urban areas.

In general, the art handicrafts require the highest skills and are the first to suffer when the established luxury class becomes impoverished.

Cottage industries reduce the villager's need to buy from others, especially from distant areas where the high cost of non-powered transportation adds much to the price. While such enterprise uses the family's spare time, saves cash outlay, and reduces costs because of transportation savings, the scattered location makes its products the most costly to bring into the larger commercial market, and into which to introduce improved methods, equipment, organization, and cheaper credit. At the same time, such technical and organizational backwardness has made the cottage worker highly vulnerable to cheaper machine-made products which can be sold right in his home village and which are steadily changing consumer demand. In terms of general improvement, this problem and the high cost of administration to improve it is one of the heaviest drags on the programs of economic development in all the countries of Asia, except Japan.

The organization of control and marketing makes another distinction. A cottage industry has housing, finance, and marketing provided by the owner, while the handicraft and small-scale industries--being part of a larger, commercial world--usually have these functions performed by a merchant-capitalist-middleman group. Hence, even though a brass-maker or cotton weaver works in his own house, if his output is added to that of others in enough quantity to support a separate group between maker and buyer, such scattered craftsmen are considered within the handicraft and/or small-scale industries.

## II. Measures of Importance

Because these industries are so scattered, it is almost impossible to construct measures of their economic importance. There are no consistent figures for value of output, value of exports, or contribution to the national income. Using the data that are available, regular employment in cottage, handicraft, and small-scale industry together appears in Table 1.

For the ten political units for which data are available--although of various dates--total employment in hand and small-scale industry is almost five times greater than in factory industry. Only in Taiwan is factory employment higher, a reminder of Japanese economic control and the lack of textile fibers, especially cotton.

In value, handicraft exports from India for 1952-53 reached Rs. 171 million [USDC 1954, p. 30] or 2% of India's total exports [UN 1953, p. 361], while in Ceylon in 1954, such goods amounted to Rs. 4.5 million or 0.25% of the export total.<sup>1</sup> Not all the labor value of such exports is necessarily the result of hand work, for, as in the case of handwoven cotton cloth, the yarn might be machine-spun; however, most of the value added or the consumer appeal would be the result of hand work.

Another measure of importance is the amount of designated government financial aid noted in ordinary budgets or the budgets of long-time development programs for various periods from 1950 to 1957. The allocations and/or reported expenditures reach 1% of the grand total only in India, and less than 1% in Burma, Indonesia, Pakistan, and the Philippines.

However, these figures do not include non-budgeted expenditure in the form of administrative and technical services by government officers and specialists, welfare grants, community and village improvement schemes, and direct contributions

Table 1. Employment in Manufacturing in Certain Asian Countries  
(In Millions, and for Years Noted)

	Cottage, Handicraft, and Small-Scale Industries	Factory	Total Population
Burma, 1931	.5 a	.1 a	14.6
China (mainland)	20.0 b	3.0 c	582.6 (1953)
China (Taiwan)	.15 (1952) d	.5 (1950) e	8.0 (1952)
Hong Kong	.15 (1953) f	.09 (1951) g	2.2 (1952)
India	20.1 (1952) h	3.0 (1952) i	361.0 (1951)
Indonesia, 1938	2.5 j	.3 j	70.0
Japan, 1951	5.3 k	3.6 l	84.0
Pakistan, 1950	5.0 m	.2 n	75.0
Philippines, 1951	.3 o	.2 p	20.2
Viet-Nam	1.5 (1953) q	...	25.0 (1951)
Total	55.5	11.99	

#### Sources

- a. Thompson [1947, pp. 27, 32].
- b. ECAFE [1954, p. 98]. Figure applies to cottage and handicraft industries only.
- c. Cheng [1951, p. 6].
- d. UN [1954, p. 169].
- e. Chen [1954, p. 177].
- f. ECAFE [1953a, p. 83].
- g. Gt. Brit. [1952, p. 33].
- h. Gt. Brit. [1953, p. 123].
- i. Hyderabad [1954, pp. 148-155].
- j. Sitsen [1943, p. 22].
- k. Japan [1954, Table 25, pp. 60-61]--figures here apply to 1.9 million employed in manufacturing establishments of 1-19 persons; and UN [1954, pp. 167-168] --figures here apply to 3.4 million employed in "rural and family industries."
- l. Japan [1954, Table 25, pp. 60-61]. Figures apply to employees in establishments of 20 or more persons.
- m. Gt. Brit. [1951, p. 98].
- n. *Ibid.*, p. 129.
- o. Personal letter from B. A. Quiaoit, Director of Commerce, Republic of the Philippines, Manila, June 20, 1955.
- p. An approximation derived from 517,000 noted in ILO [1953b, Table 9] for all manufacturing, minus 300,000 in the preceding column.
- q. ECAFE [1953a, p. 83].

from private organizations and foreign agencies.<sup>2</sup> Likewise, as in India [ECAFE 1953b, pp. 65-66], Ceylon [IBRD 1953, pp. 593-594], and Thailand [Ingram 1955, p. 140], preferential government purchases of cottage industry products, and restrictions and taxes on articles manufactured by machine, constitute very direct economic aid. However, the small figures of assistance do reflect lack of interest, at least when the plans and budgets were first drawn up. Increased support since the initial planning period has definitely been indicated in Pakistan [Dhami 1954b, p. 279, ft. 3], while interest in some of the other countries



is growing. There are many such evidences in government reports, publicity releases, the assignment of officials to planning and technical conferences sponsored by United Nations agencies (ECAFE, ILO, UNESCO, and TAA), by product displays at home and abroad, training in technical schools, and by special legislation and promotion.

### III. Drawbacks and Advantages

To many nourished on Western economics, any preservation and extension of cottage and small-scale industries looks like turning the clock back. This is particularly true in view of the pressing needs in Asia for large capital investments that will enable agricultural and industrial increases to rise faster than population and to reduce unemployment and underemployment. Such is the core of the economic planning in not-too-crowded Burma and much-too-crowded Java.

Against the revival and subsidization of cottage and small-scale industry a number of difficulties may be cited. For example, where mass buying power is low, people will buy machine-made goods that are cheaper. Also, more attractive factory products are changing consumer taste in Asia in their favor, since they are shinier, better wrapped and finished, standardized in appearance, and often represent the modern world which attracts many people vaguely discontented with things as they are. Investment in equipment for rural industry, whether hand-run or powered, locks up capital while the craftsman is farming or where raw materials are available only part of the year. High-cost credit to such industry reflects the high cost of moving raw materials and finished products between scattered producers and markets, especially where transportation is inadequate. The heavy cost of administration, technical improvement, and education by government over large areas is a charge on the whole cost of government for a special class. And finally, inefficient hand industry is not permanently helped nor is it fair to labor and owners in factory industry that their output be taxed, as in India, in order to shelter the former.

There is also a professional kind of argument used by economists who oppose such industry. Aubrey points out that many economists, remembering the fate of hand industry with the rise of the Industrial Revolution, make "gloomy references to the 'iron laws' of history" so that "the eventual application of [large-scale urbanized industries] is regarded as inevitable [in Asia]" [1951, pp. 273-274, 300]. He discussed some of the conditions in Asia of 1950 that make it different from Western Europe of the early 19th century and supports the contention that "if capital is scarce and expensive, and if labor is plentiful and cheap, it would seem natural to combine these two factors in a less capital-intensive technology than in industrial countries where the relationship is reversed."

The cottage and small-scale powered industries have the potential, at least, for achieving that goal. They require little capital, maximize employment, raise local purchasing power, earn foreign exchange and/or conserve it against imports, save transport costs where using local raw materials, preserve hereditary arts and skills, and give training for the introduction of needed heavy powered industry. Since most of the people of Asia work in farming for only six to eight months of the year, and since emigration or resettlement can never solve the problem of pressure, decentralized light industry has a great attraction.

Such industry must be improved in every way. As the Director-General of the International Labour Organization, speaking in Tokyo in 1953, states, "..... the problem will be to develop a new type of industry--radically different both from the present cottage and handicraft industries and from the present large-scale factory industries--which for the same amount of capital investment can at the same time produce more than the former and provide more employment than the latter. The solution of the problem of underemployment depends in large measure on the possibility of achieving this" [ILO 1953a, p. 40].

The question of whether or not to promote such industry needs no answer in Japan, as in the other countries of Asia, for it has been an important part of the modern economy since 1868. Lockwood notes that as Japan industrialized after 1868, existing small-scale industry was quickly drawn into the production system by virtue of Japan's "geographic compactness...[for] it was far easier [here] than in continental India or China to diffuse new ideas and skills through the countryside", to attract nearby labor, and to "create easy, efficient ties...with factories, banks, and merchants" [1954, pp. 213-214]. Electric power permitted wide distribution of small shops, while economic and social response to intensified industry among the masses was favorable. Finally, industrialization in the other parts of Asia began with large foreign investment and control against which the small producer had no government protection; in Japan, the government was immediately alert to preserve national economic interests, while native businessmen could work directly with their own people and within their own economic system.

In India, on the other hand, concern for the small hand unit has been a recent reaction against the effects of factory production, led mainly by Mahatma Gandhi following his return to India from South Africa in 1915 [USDC 1954, p. 5]. His motives were mixed: political--against British rule and economic control; economic--to raise the living standard of the rural masses; and spiritual--to promote self-discipline within the individual for the cultivation of more constructive social attitudes. Although "Gandhian economics" is attacked as backward, the Congress Party is strongly committed to the ideals if not the program, even though today, contrary to the situation before and during World War II, the Indian cotton mills are producing enough cloth both for domestic use and for export.

Other influences have aroused interest in such industry in Asia. During World War II the example of the Chinese Industrial Cooperatives was important, and since then, stimulation by several UN agencies has been strong, with special emphasis on cooperative organization. Also, there is increasing attention by businessmen in Western countries where the demand for handicrafts at all price levels is large.<sup>3</sup>

The most urgent task of cooperatives is to reduce charges for credit and middleman functions so that the producers receive a larger share of the sales price. For this, societies for credit or purchase-and-sale confer the benefits of the economy of scale without the need for large capital investment. On the other hand, industrial or producers' cooperatives, particularly where special skills or task specialization is required, generally create more problems than they solve. As a political or social ideal they are commendable, but beyond emergency conditions they make for poor business operation and hence weak cooperatives.<sup>4</sup>

#### IV. The Needs in Asia

Since not all cottage, handicraft, and small-scale industries will realize the full list of aims given above, choices must be made among several aims, such as: to raise employment (weaving cloth, making cigarettes), scatter production to supplement local purchasing power (weaving mats, making paper, making straw sandals), earn foreign exchange (making such exports as rugs, brassware, embroidery, baskets), and to reduce imports (production of chemicals, matches, hardware, and umbrellas).

Choosing among the foregoing aims often requires deliberate and quantitative decisions based on a multitude of variable factors. For example, in an ECAFE study of weaving in Burma [1952c, pp. 72, 89], a power loom was noted as costing at least Rs. 3000, compared to a fly-shuttle hand loom for Rs. 115. Assuming that each loom employs one weaver per shift, on the cost price alone Rs. 3000

invested in hand looms would give work to 26 more weavers than if invested in a single power loom. Also, using Mehta's [1953, pp. 114-115] comparisons of loom productivity, wages, and labor costs for certain areas of India, the 26 hand loom weavers would produce four times as much cloth as the single power loom weaver, but the latter would earn 25% more in wages, and the labor cost per yard of cloth would be at least three times less. As a result, the cloth would be cheaper, assuming all other charges to be equal and not trying to recover in a short time the cost of the much higher investment.

But the issue is more complex than that of increased employment versus cheaper cloth. Basically, the justification for improved handicraft and small-scale industry is that it offers a way to stimulate productivity throughout an overburdened economy at a pace rapid enough to maintain or achieve a reasonable standard of living yet without too drastic economic and social dislocation. Thus, in very simple terms, if 4 men could be taken off hand loom weaving and each equipped with one power loom to produce as much cloth as 26 men at hand looms, the economy would have 4 men getting higher wages and 22 men displaced. The 22 disemployed weavers are a problem, but not nearly the problem of 26 underemployed and unemployed-to-be because of their technical inefficiency. There is at least a prospect for the 22, because the cheaper cloth on the market would eventually release greater buying power to support them in other, more productive tasks, and perhaps some of them in hand weaving specialized cloths that more people could afford. Also, the higher wages to the 4 power loom weavers would increase local buying power and so benefit the other 22.

This prospect has been squarely presented to the Government of India in a report on small industries prepared by an international planning group sponsored by the Ford Foundation in 1954, and expressed as follows [India 1954a, p. 64]:

"It seems to us that to stop the processes of modernization and development for the mere purpose of apparently preventing unemployment, when every field of India needs goods and services, such as roads, etc., is short-sighted. Especially when, in fact, modernization creates employment.

"Higher wages under [modernization] lift the worker above a mere subsistence to a respected consumer of goods of every description. It preserves and enhances India's position in the world as a producer for the world's needs. To prevent it forces stagnation and retrogression. All this is in the false fear that modernization can take place overnight. When in fact it is a relatively slow evolutionary process which takes years and which India should accelerate.

"We believe thoroughly in the decentralization of industry. It is the best method by which agriculture can be effectively balanced with industry. Individual units of production should be brought to rural areas, not great centres of industry created which syphon population to them. Expansion within existing large centres already overcrowded, with consequent degradation of proper living, is to be discouraged."

There is evidence that this higher productivity point of view in improved small industry is making an impression in India where the battle to date has been joined between the advocates of big industry and those who favor preserving traditional hand industry for increasing village employment and local self-sufficiency. For example, also in 1954, an Indian Government Commission for the first time recommended an annual conversion program of 20,000 hand looms into 10,000 power looms and of 38,000 more hand looms into 25,000 improved (semi-automatic) looms over a 15-20 year period [India 1954b]. This is the kind of break-through needed in an economy greatly held down by rural underemployment, but other changes would have to be introduced at the same time in order to keep pace. Whether such thinking will be adopted by other countries in Asia and fashioned to their needs remains to be seen.

One of the most acute and sensitive observers of economic change in Asia explains why "governments must extend services which compete with capital formation" [Belshaw 1954, pp. 11-31]. His point, on economic grounds, is that unless there are "adequate services designed to accelerate the process of innovation (through all parts of society), investment is likely to go to waste, and productive power will fail to outstrip population increase." Thus, "social welfare is a means as well as an end" to stimulate both the desire for improvement and activity to fulfill that desire. Among the various non-capital-creating uses of resources which promote the capacity for expanded productivity are land reform, better labor standards, nutrition and health programs, education and technical training, public utilities, small-scale industry, and community development that stimulates self-help on a cooperative basis.

This is a long-range argument that few national leaders in Asia have made explicit beyond the narrow claims of social welfare for political purposes in the countryside, for emergency relief, and to relieve unemployment.<sup>5</sup> It is a point of view that has to batter down the strong resistance of many Western-trained economists, bankers, and business leaders in the cities, although there is considerable hand and small-scale power industry carried on within the cities also.

#### V. Six Types of Non-Factory Industry

The six types of non-factory industry given below vary according to the importance of the needs recognized in each country. Type A attracts little attention. Where population pressing on the means of subsistence is considered urgent, as in India, Pakistan, and the Philippines, help for Types B and C that serve the domestic market is regarded as a welfare measure. Production for export, Types D and E, is everywhere promoted for foreign exchange. Type F, using power, is part of the program, at least in Burma and Indonesia, to build up mechanized industry as rapidly as possible.

A. Cottage industry for home use. In this type, common to village households throughout Asia, the chief aim is to make local materials into everyday articles to save buying from others. Home-grown cotton or wool, wood from the village woodlot, bamboo from the grove around the house, straw from harvested grain, and now the tin of an empty can--all are converted into household artifacts by members of the family with simple tools in their spare time. For the most part close to natural forms, they have no place in the commercial world except to limit sales of machine-made replacement wares. Their production usually follows a sex distinction, but there is no other labor requirement or regulation.

B. Cottage industry for the local market. This type covers the ubiquitous village carpenter, blacksmith, shoemaker, potter, spinners, and weavers who make or repair objects for barter or sale to neighbors or in nearby village markets. Their range of output is limited not only because production is small and local buying power low, but also the goods are not attractive enough to be marketed at a distance. Hence, they cannot afford to modernize, yet without technical and marketing improvement, they cannot hold their own, much less prosper. It is this large group of rural artisans for which it is so difficult yet so necessary to make economic provision at the present time in several countries of Asia. Their salvation lies logically in the spread of village development programs that provide technical help to them and, at the same time, raise the prosperity of the whole community.

C. Small-scale hand industry for the domestic mass market. One of the best examples of the difficulties for improving a small-scale industry that serves the domestic mass market is the weaving of cotton cloth by hand looms and small power looms in India. The cotton mill industry--spinning and weaving--is the biggest



mechanized manufacturing industry in the country in capital investment and employment. Yet as Table 2 shows, hand looms still employ 74% of the weavers and produce 16% of the cloth. This disparity is the heart of the problem, both for the large number of hand loom weavers and those who depend on them. Not only has the machine-made yarn and cloth from the cities weakened the traditional textile specialty centers, but in the 20th century mills have also moved into the interior from Bombay, Ahmedabad, and Calcutta with the extension of railroads and power production from Indian coal, and later, hydroelectric plants. Changes in transportation, both railroads and deep-draft shipping, as well as the growth of internal instead of export markets, are two additional reasons for the decay of many of the pre-industrial hand loom weaving centers formerly clustered along the coasts [Sharma 1948, pp. 32-34]. However, not all the mills are big cloth producers. Especially in Madras in the south, spinning mills that supply yarn to hand loom and small power loom weavers are much more numerous than combined spinning and weaving mills.

Table 2. Measures of the Indian Cotton Weaving Industry  
(Generalized as of 1950-1951)

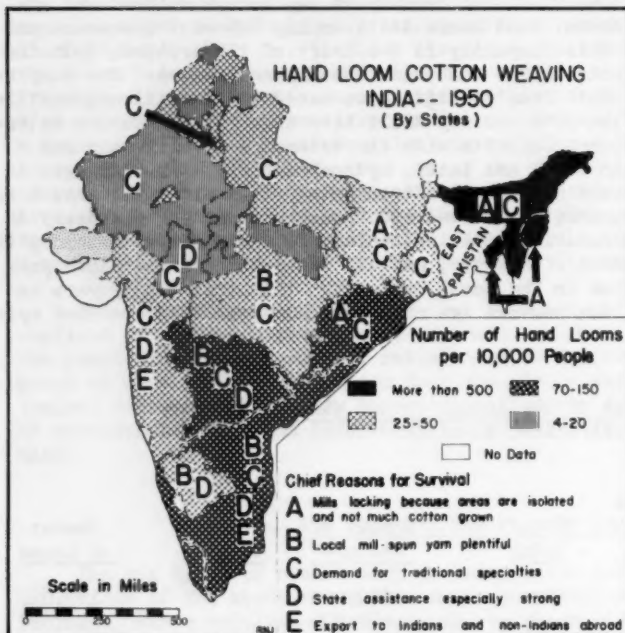
	<u>Production</u> (millions of yards)	<u>% of</u> <u>Total</u>	<u>Number of</u> <u>Weavers</u>	<u>% of</u> <u>Total</u>	<u>Number</u> <u>of Looms</u>
Mills	4,076	82	790,000	24	193,000
Power looms	85	2	50,000	2	22,500
Hand looms	<u>800</u>	16	<u>2,400,000</u>	74	2,800,000
Total	4,961		3,240,000		

Sources: Based on Mehta [1953, p. 106]; Hazari [1954]; India [1951b, p. 221]; and Gt. Brit. [1953, p. 205-207].

Hand loom weaving has survived in different areas for various reasons. On Map 1 the States are combined into major groups according to the number of hand looms per 10,000 people in each State. The resulting pattern reveals four surprisingly compact areas of different loom densities and goes far to illuminate the various reasons for survival noted in the literature.

Loom density is especially high in the States of the northeast corner, largely because poor transportation and the lack of raw cotton have discouraged the entrance of mills. In the south, although cotton is abundant, mills were built relatively late--mainly after World War I--and have concentrated more on spinning, as noted above. Third, many traditional specialty textiles are still made in the old centers, though in reduced volume. Also, in some States, official assistance has kept the hand weavers going. Finally, as in Bombay and Madras, exports both to Overseas Indians as well as to non-Indians, are important and are being pushed by the Central Government, particularly throughout Southeast Asia [USFDS 1954].

Mehta points out that with the increased use of mill-spun yarn by the hand loom weavers the latter have been freed from concentrating near the raw cotton and hand spun yarn supplies. Today, therefore, "commercial hand loom weaving [is] largely an urban industry...increasingly coming under larger units of operation". He goes on to list some of the advantages of this concentration: the use of better and more specialized treatment of yarns, the greater ease in spread of improvements, and in general, the greater economies of larger-scale operation [Mehta 1953, pp. 104-106]. There are, of course, some disadvantages in reproducing



Map 1.

## Sources:

Number of hand  
looms: India  
[1954c, pp. 5-11].

Reasons for sur-  
vival: India  
[1954c, pp. 7, 8,  
21]; NPC [1948,  
*passim*].

crowded factory conditions and in drawing from the countryside workers who might help to maintain local purchasing power.

Another feature of the commercial hand loom industry, whether carried on in cottage or central workshop, is that the middleman makes a great drain on the income to the producer. Yet, he has arisen to perform needed tasks, needed because producers are far from market, or having low output or small sales, they require capital advances. Assuming that rural industry arises close to raw materials, with a later shift to market centers as specialization increases, the ancient role of the middleman in expanding the market becomes clear. It is he who beats the path to and from the maker's door, thereby gaining control of the economic welfare of the artisan and often of the industry itself.

To lighten credit and marketing burdens for small-scale producers are two of the hardest tasks in economic improvement. The old functions must be carried out, but the administrative cost of replacing the old agents of the transfer process are heavy.

D. Handicraft industry for luxury markets at home and abroad. With much the same organizational history and pattern as the former, the luxury handicrafts are also declining almost everywhere in Asia because the courtly ruling class has declined. In numbers it is probable that the fabled craftsmen of Asia never approached the larger number of people who spun, wove, molded, and carved for the mass market, but their influence in setting standards and styles was indeed profound. They were lodged at every court city where costly raw materials could stand the cost of shipment, or conversely, where the raw material was bulky, production was carried on at a distance under the supervision of special court officials. In China, the fine porcelain and the silk brocades for court and official use were made in the lower Yangtze Delta and shipped out to consuming centers elsewhere.

Modifications of such wares are currently being promoted for domestic luxury buying as well as export to limited markets in Western countries. However, distance is thus compounded by cultural differences, plus currency and trade problems.

One of the most promising examples is the commercial missionary effort of an American architect, James H. W. Thompson, who had enough interest, capital, and contacts in New York to move to Bangkok in 1948 and there build up a handloom luxury silk export trade. He revived an expiring craft by retaining the old patterns but using reliable dyes and colors to appeal to Western buyers. Contrary to the normal middleman practice, the heads of the village weaving groups share in the profits. Retailing at about \$25 a yard in the United States, the cloth can "afford to travel" from as far as 300 miles north of Bangkok [ECAFE 1952a, pp. 1-8].

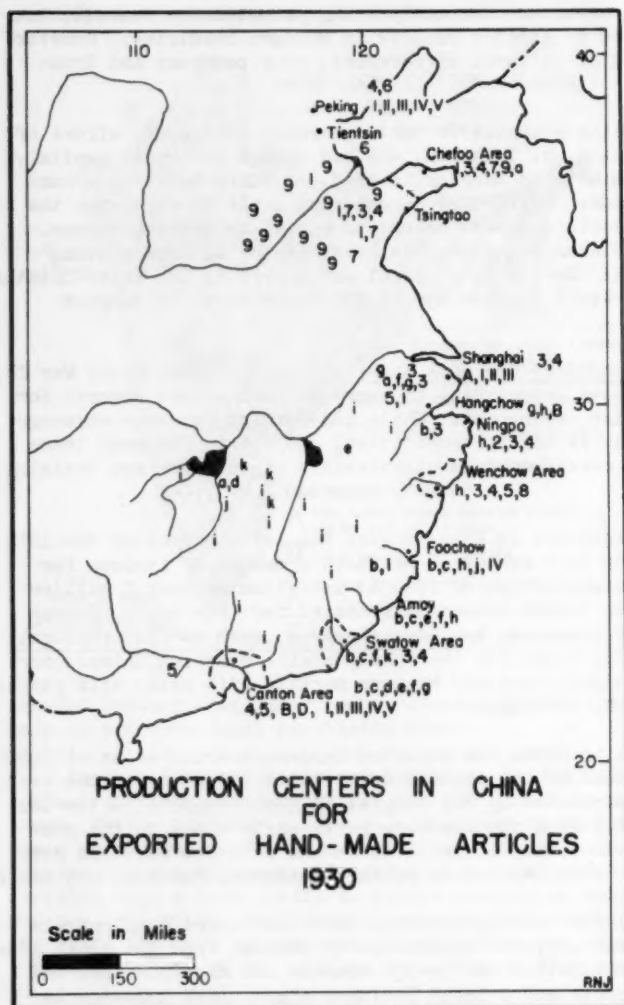
E. Small-scale hand industry for mass markets abroad. Since World War II, all the Asian governments have been trying to increase mass-market exports for foreign exchange and to raise employment. While the foreign exchange earnings are irresistible, the market is highly competitive, subject to frequent trade restrictions, and requires considerable administrative expenditure and training, both at home and abroad.

The record of such enterprise in China during the last quarter of the 19th and the first quarter of the 20th centuries provides a number of lessons for similar export activity elsewhere. As of 1930 it is estimated that 7 million people got full or part-time income from making things for this trade [Herman 1954, *passim*]. Only 5% of them made traditional wares, such as firecrackers, joss sticks, and soft writing paper for the fairly stable Overseas Chinese market, while 95% served the highly variable Western markets with mats, silk pongee, strawbraid, lace, needlework, and rugs.

The production centers in China for exported hand-made articles as of 1930 appear on Map 2 [Ibid.]. Most of the centers were within 150 miles of the east coast, but with deeper penetrations up the Yangtze Valley. Exports to the Chinese mass market came chiefly from the southern part, while those to the non-Chinese mass market were made mostly in north China and in a few southern port areas. Luxury exports were concentrated in Peking, Shanghai, Foochow, and Canton.

There are many reasons for these groupings, based on export developments since the end of the 18th century, the emigration of Chinese from the south since the middle 19th century, stimulation by foreign traders and missionaries, the growth of coastal trading ports and a local business class, weak industry in Southeast Asia to satisfy such consumer demands, the interruption of European handicrafts during World War I, and the like. Some of these crafts were attracted to the coast from older centers inland, and some were partly or wholly introduced from abroad by Western businessmen.

These developments have intensified three features of commercial production in China. First, was the assembly-line system which has long been practiced both in the ancient handicrafts and in newer powered small-scale industry. Second, was the supervision by the foreign exporter and his Chinese agents over the manufacturing and marketing processes, a tendency that has worked against the growth of strong cooperative endeavor in production and marketing. Third, has been the tying of a large number of people along the coast to distant and uncertain markets. With Asian governments increasing their activity in such export industries, there is still no guarantee that the producers will be able to get a larger share of the sale price or more stable employment, except as these aims are specific parts of the official program.



Map 2.

To Chinese Mass Market  
To Chinese Mass Market  
Abroad

- a. Brush pens
- b. Joss paper
- c. Joss sticks
- d. Needlework
- e. Porcelain
- f. Pottery and earthenware
- g. Silk piece goods
- h. Umbrellas, paper
- i. Writing paper, Ch.
- j. Woodenware
- k. Grasscloth

To Non-Chinese Mass Market  
Abroad

1. Hair nets
2. Hats, all fibers
3. Lace
4. Needlework
5. Mats and matting
6. Rugs
7. Silk pongee
8. Soapstone carvings
9. Strawbraid

To Both Mass Markets

- A. Brassware
- B. Fans
- C. Firecrackers

To Both Luxury Markets

- I. Ivory carvings
- II. Jade carvings
- III. Jewelry
- IV. Lacquer ware
- V. Cloisonné and enamel

F. Small-scale powered industry. The small-scale powered industry of Japan is in some ways a model for Burma, Indonesia, and India.<sup>6</sup> It provides an answer to those who oppose small-scale industry because it is small, and a goal to those who seek to make small units efficient.

An ECAFE report of 1953, circulated to all the member nations, summed up the position of small-scale industries in Japan [1953c, p. 14]:

"These industries make up 99% of all factories employing less than 300 workers; they employ 66% of all workers and produce 45% of the total output. Using 200 employees as the basis, shops with less than 3 people make up 57% of the total, and shops with 4-49 people comprise 39% of all factories. Basic materials are produced by large-scale industries, but...60% of the total exports from Japan are produced by small enterprises."

However, there are several important features of Japan's physical and cultural setting that cannot be so easily duplicated in other countries. By size



and configuration the Japanese centers of production are readily accessible to the coast and were quickly brought into the export economy, and electrified. At the start of industrialization, the traditional cottage industries were already flourishing and the people accustomed to producing surpluses for trade rather than just for local use as need arose. Also, techniques were constantly improved by schools that formed around fine masters. "Another reason for such high efficiency in Japan is the large number of organizations providing some type of common facility to the small industrialist. There were over 18,000 groups carrying out such functions as purchase of raw materials, sale of finished products, inspection, research, credit, marketing, and others...Many of these common facilities were co-operatively owned..." [ECAFE 1953c, pp. 9-10]. According to Lockwood, such organizations and facilities were provided by local chambers of commerce and guilds of industrialists and merchants to which, between 1884 and 1902, the government gave legal status and tax immunities. In the early 1930's the government "strengthened them with low-interest loans and subsidies, encouraged them to engage in joint purchase and sale, financing of members, and inspection and standardization of goods; in some cases, they were urged to control output and prices...or given compulsory power to enforce the compliance of non-members with their regulations [1954, pp. 569-570].

By comparison, conditions are much different elsewhere in Asia. Small-scale and handicraft industries are primarily for domestic markets, they are spread over large areas and lack cheap power and technical efficiency. Factory-made goods are already well entrenched, and there is not everywhere a strong production-for-sale motivation, private business organization, or even an active entrepreneur class. Hence, government is expected to provide economic planning, initiative, capital, and temporary welfare measures to get such enterprises started and to keep them going.

In Burma, the government program is to "encourage" new small-scale private enterprises, presumably powered [Lloyd 1954, p. 131]. In Indonesia, government aid to cottage and small-scale industry since 1951 is an extension of the former Dutch efforts [Sitsen 1943, p. 22; Furnivall 1936, pp. 365-376] by a double-pronged attack. In areas where such industries already exist, the government is setting up central production-processing-purchase-and-sales units as the model for the improvement of small industries directly [Djojohadikusumo 1954]. The aims are to supply more consumers' goods, reduce imports, and decentralize industry. In India, a definite program of conversion to power has yet to be set up although craft schools and research institutes are multiplying.

In all these types of industry the role of government varies from different degrees of direct participation to the encouragement of private activity. Where government steps in to do the job, officials must be trained in business, accounting, technical processes, and educational methods, the practice of which often runs directly opposite to their interest in becoming officials. Likewise, they must travel and live in the villages and somehow overcome the popular reluctance to communicate with officials. As businessmen they must have enough capital and freedom to operate instead of having to refer decisions to a distant center. Yet as underpaid civil servants they work in a system that is built to keep close check on their uses of public funds. Armed with more capital than is available to the ordinary man, they have the power to make economic decisions that affect others, but they may not have either the training or the personal responsibility for the success of such investments as does the private entrepreneur.

The costs of improving small, scattered enterprises are heavy, and the pace is slow. Yet, the growing understanding of the need to make such changes is one of the new directions of economic development in Asia. The popular post-war dreams of large-scale Western-style industry in every town's backyard are coming to allow a little space for the improvement of cottage and small-scale industries.

### Notes

1. Personal letter from the Acting Commissioner of Cottage Industries, Colombo, Ceylon, April 4, 1955.
2. Details of such grants to India and Pakistan, respectively, appear in Dharni [1954a, pp. 456-457, 467, 471; 1954b, pp. 279-280].
3. For example, in Seattle local business interests have promoted annual International Trade Fairs since 1951 with increasing emphasis on handicrafts, especially from the Far East, in an effort to give the city a special competitive function against the larger ports of the United States. In 1954 and 1955, the Fair was preceded by a week-long Marketing Conference at which foreign businessmen and government officials met their American counterparts for instruction on improving sales in the American market. It is believed that in no other city in the world have the private businessmen gone to so much effort in this direction. Also, it recognizes that the increasing role of Asian governments in business requires that their officials quickly become familiar with international trade practices.
4. Based on the writer's experience in various capacities with the Chinese Industrial Cooperatives, 1938-1948, and the observation of several European cooperative specialists in Asia.
5. It has been strongly recognized and stated by Gandhi in numerous writings [cf. 1940]; by Nehru [ICWL 1954]; and by Burma's Prime Minister, U Nu, as noted in Trager [1954, p. 44].
6. The example of Japan is specifically cited in India [1951a, pp. 167-168], while machinery for cottage and small-scale industry made in Japan is listed, after such a list for Indian manufacturers, in India [1954c, pp. 162-164].

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## SOME SPATIAL ASPECTS OF URBAN GROWTH IN THE UNITED STATES\*

Studies of the spatial organization of the nation's economy have advanced the hypothesis that our economy may be looked upon as an interrelated system of metropolitan communities. These metropolitan communities, such as Boston, Cleveland, Denver, New Orleans, or St. Louis, consist of a central city as a metropolitan center and the population "oriented" to that center, including population domiciled in smaller cities nearby and also in the rural countryside. The metropolitan center forms a local population density peak. The other "oriented" cities, themselves sub-centers, interspersed at various distances from the metropolitan center, form lesser local population density peaks. The population system, it is held, shows characteristics of structure; for example, population density falls off around the major centers in more or less regular fashion.

One of the more interesting questions arising from this interpretation of the spatial structure of the nation's economy concerns the description of the spatial pattern of growth of cities in the metropolitan communities. Now, in fact, have the cities of the United States grown in its different parts? The answer to the broad question of urban growth in space in a developing economy would require a broad program of research extending over many years.

The present study attempts only a rough, first approximation to an answer by observing with simple measures some spatial aspects of city growth in the United States. It concerns the growth, over the life of the nation, of the 1,262 cities in the nation that in 1950 contained within their city limits populations of 10,000 or more. Following the only comparable series of data on city growth published for the 16 census decades since 1790, the study observes the statistical frequency distribution of the percentage rates of growth of the cities 10,000 or larger in 1950 during each decade from 1790-1800, when only 55 of the cities were yet in existence, to 1940-1950, in the base year of which decade there had appeared 1,225. This article records an attempt to perceive some of the spatial characteristics of the cities, so defined, having growth rates found in different parts of the national frequency distribution of their growth rates. It also attempts an interpretation of these findings. Here, then, some influences of location upon urban growth in the United States are described insofar as they can be measured by classifying cities by geographical location and distance from other cities.

### I. Regional Divergence of Growth Rates

#### A. Rates of Growth by Regions.<sup>1</sup>

Do the cities located in the different regions or geographic division of the country tend to fall into the same relative positions in the national frequency distributions of growth rates each decade? Does regional growth take place by a general advance of the rates of growth of all cities in the region, or is the regional advance characterized by a variability of rates? To begin an investigation

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\* This study was made with the assistance of the Bureau of Population and Economic Research, University of Virginia. At present the author is a member of the staff of the Federal Reserve Bank of New York. However, the author alone is responsible for the accuracy of the statements made here and for the interpretation of the findings, and his views are not to be attributed to either institution.

of these questions, a rough measure of regional divergence in growth rates has been employed. Each decade the observations (growth rates) have been ranked and divided into quintiles of the ranks by regions. The object of this technique is to reveal characteristic shifts in position within the national distribution of the growth rates of the cities located in different sections of the country. Table 1 summarizes the information revealed by this device. The table gives the number of cities, classified by region, in each quintile of the national frequency distributions each decade, I being the quintile of highest percentage rates of growth, V being the quintile of lowest rates. First, it is clear that within as well as between regions, considerable variation in the growth tendencies of the cities occurs. In each decade after 1870-1880, no region failed to contain cities in each quintile of the national distributions. It seems that greater than average growth for a region implies not greater than average growth for all cities, but a larger than average number of its cities growing at high rates. A randomly drawn city from a region of rapidly growing cities may yet fall within the lowest quintile.

Study of the quintile arrays also reveals characteristic shifts over the decades in the growth rates of the cities located in the different regions. If no regional differences in growth rates existed, the cities in a given region would be equally distributed among the quintiles, twenty per cent of the cities in the region falling into each quintile. For example, in the Northeast in 1940-1950, assuming no regional divergence in rates, the number of cities in each quintile would be one-fifth of the total number of cities in the Northeast in that decade, that is, 71. If the observed number of cities in a quintile is compared with the number computed under the assumption of no regional divergence, the resulting figure represents a positive or negative discrepancy. For example, in the Northeast in 1740-1950, the discrepancies for the quintiles are (20-71) or -51; (26-71) or -45; (61-71) or -10; (95-71) or 24; and (153-71) or 82 for quintile I through quintile V respectively. Such a measure would produce a table like Table 1 but with discrepancies rather than observed number of cities in the cells. Let us consider what such a table would reveal about regional divergence in the growth rates of cities.

The Northeast would appear as a region of stable but declining growth rates compared with the nation. It is characterized by negative discrepancies in the high quintiles, positive ones in the low quintiles, and there appears in it a tendency towards increasing positive discrepancies in the lowest quintile. In every decade from 1790-1800 to 1940-1950 this region displayed negative discrepancies in the first quintile, and in all but four decades, only one of these since 1860, in the second quintile. But positive discrepancies, which were typically highest in the third and fourth quintiles during the nineteenth century, appear to be getting larger each decade in the fifth quintile since around 1900-1910.

The pattern of regional divergence of growth rates of the cities is markedly different in the Southeast. Greater variation among the quintiles and a change of direction of quintile movement during the decades immediately preceding and following the Civil War distinguish this region from the Northeast. From 1790 to 1820 the cities of the South, though few in number, were among the fastest growing. In 1830 they gave way at the top of the distribution to the new cities of the Central region. From 1830 to 1870 Southern cities showed negative discrepancies in the upper quintiles. Then in the next decade, 1870-1880, a negative discrepancy appeared only in the middle quintile: the variability of the growth rates of these cities increased. Gradually since then these cities have grown relatively more rapidly--not, it is true, so rapidly as the newer cities of the Far West and Southwest, which have excelled in growth rates in the twentieth century, but faster than the Central region, where, after a surge of growth from 1810 to 1870, there has been a settling down of growth rates characterized by negative discrepancies in extreme quintiles and positive ones in middle quintiles.

Stability of growth rates compared with the nation has been a feature of the Central region. The period of its rapid development noted above, from 1810-1820 to 1860-1870, was ended by the continuing westward 'migration' of the highest growth rates to the new cities of the Northwest and Far West. Afterwards, the Central region has displayed a disposition towards balanced growth rates compared with its younger sister regions. Yet it has also reflected some of the vicissitudes of a more mature status. After 1880-1890 a tendency towards negative discrepancies appears in the second as well as in the first quintile, a tendency overcome in the twentieth century only during the decade of World War I.

The cities of the Southwest and the Far West have consistently grown at the highest rates. For a century, with one exception in the Southwest, proportionately more of these cities have ranked in the first quintile. Almost as often, proportionately fewer of them have been found in the lowest quintile. In every decade during the century the Southwest has had a positive discrepancy in the second quintile, but in every decade since 1900 the positive discrepancy of the Far West in the first quintile has been percentagewise much greater. The Northwest, though equally young, has not produced such consistently rapid growing cities. From its first reporting in the census in 1860 to the decade 1900-1910, this region had large positive discrepancies in the first quintile except for the decade 1890-1900; but during the twentieth century the growth of its cities has been more erratic and unstable compared with the nation.

Third, in addition to the pattern of divergence displayed by each region, one thinks he can see in Table 1 the suggestion of the growth features of the typical region. Except for the Northeast, not a good example because it was relatively 'old' in 1790, we might imagine that the cities of this typical region have come into the national frequency distributions at the upper end of the percentage scale in the first decade they are reported. In the second decade the number of cities increases. There is a tendency for the cities to spread out among the decade rates, the region retaining positive discrepancies in the first quintile, but the cities scattering into the lower quintiles. With the passage of time, the increase in number of cities in the regions continues, but most cities experience a settling down of growth rates. The time required for this settling process and its characteristics seem not to be typical but to vary from region to region.

#### B. Level and Variability of Rates of Growth by Regions

Regional divergence in growth rates has been studied also by reference to the level and variability of the regional rates of growth. Retardation of average growth rates over the decades and relative instability of rates seem to accompany rapid growth in all regions. It would appear from these data that differences in regional growth are related to the timing and duration of periods of rapid growth in the population of the nation as a whole.

First, let us compare, for each region, the percentage rate of growth of the total population, the median percentage rate of growth of the cities 10,000 or more in size in 1950, and the percentage rate of growth of the urban population (Figure 1). We see that, with few exceptions, the three rates bear the same relation to each other. In most decades in most regions the rate of growth of the urban population is greater than the median rate of growth of the cities 10,000 or more in size in 1950. Also, as time has gone on, the separate rates have tended to converge in each region. These figures illustrate for the different regions several important features of city growth. One such feature is retardation in the average growth rates of the cities in each region. A second is the consistently high average growth rates of cities in newly populated regions. A third is the instability of rates for cities in 'new' regions and cities in regions with high average city growth rates.

**Table 1.** Number of Cities in Each Region found in Each Quintile of the National Frequency Distribution of the Percentage Rates of Growth of Cities 10,000 or Larger in 1950, by Decades, 1790-1800 to 1940-1950

DECADE	NORTHEAST QUINTILES						SOUTHEAST QUINTILES						SOUTHWEST QUINTILES					
	I	II	III	IV	V	TOTAL	I	II	III	IV	V	TOTAL	I	II	III	IV	V	TOTAL
1940/1950	20	26	61	95	153	355	56	72	40	24	12	204	49	27	11	11	3	101
1930/1940	24	30	68	101	130	353	75	63	42	16	7	203	36	22	18	15	10	101
1920/1930	39	60	52	92	107	350	49	54	46	25	24	198	29	31	10	7	17	94
1910/1920	46	55	72	86	80	339	32	45	38	36	37	188	25	19	13	12	14	83
1900/1910	38	58	73	87	64	320	40	43	40	25	32	180	25	17	8	7	11	68
1890/1900	45	55	72	61	49	282	45	29	30	31	32	167	16	14	5	8	8	51
1880/1890	23	53	63	70	54	263	33	33	32	23	23	144	11	9	1	7	3	31
1870/1880	25	41	65	60	47	238	24	23	18	25	30	120	9	5	1		3	18
1860/1870	20	24	39	52	46	181	13	13	17	16	31	90	1	4	1	3	2	11
1850/1860	15	22	36	41	37	151	7	12	14	13	19	65	2	3		2	1	8
1840/1850	14	24	28	28	23	117	3	5	5	10	9	32						
1830/1840	10	22	22	25	23	102	4	2	6	5	6	23						
1820/1830	17	18	21	20	16	92	1	2	3	3	5	14						
1810/1820	10	19	16	18	16	79	5		3	1	2	11						
1800/1810	8	12	15	14	15	64	7	3		1	1	12						
1790/1800	6	11	10	10	11	48	5		1	1		7						



CENTRAL QUINTILES						FAR WEST QUINTILES						NORTHWEST QUINTILES						TOTAL
I	II	III	IV	V	TOTAL	I	II	III	IV	V	TOTAL	I	II	III	IV	V	TOTAL	
42	41	102	101	61	347	68	48	13	3	5	137	10	31	18	11	11	81	1,225
40	67	81	89	69	346	52	42	19	12	11	136	17	20	16	11	17	81	1,220
57	53	83	82	62	337	59	31	19	8	9	126	4	9	27	23	18	81	1,186
62	67	70	67	63	329	50	19	16	14	13	112	11	21	18	12	19	81	1,132
29	53	68	73	85	308	49	18	8	8	3	86	27	19	11	8	13	78	1,040
45	67	57	64	46	279	19	12	10	10	23	74	15	8	11	12	28	74	927
41	52	55	52	66	266	15	7	7	7	10	46	39	8	4	3	6	60	810
42	55	41	41	44	223	12	4	3	3	4	26	18	2	2	1	2	25	650
48	55	40	23	17	183	8	1		3	1	13	7	1	1	1	1	10	488
41	31	18	12	12	114	3					3							341
21	9	6	1	7	44													193
15	5	2	1		23													148
5	4		1	3	13													119
4					4													94
																		76
																		55

Figure 1.

PERCENTAGE GROWTH RATES OF TOTAL POPULATION AND "URBAN" POPULATION, AND MEDIAN OF PERCENTAGE GROWTH RATES OF U.S. CITIES 10,000 OR LARGER IN 1950, BY REGIONS, 1850-1860 TO 1940-1950

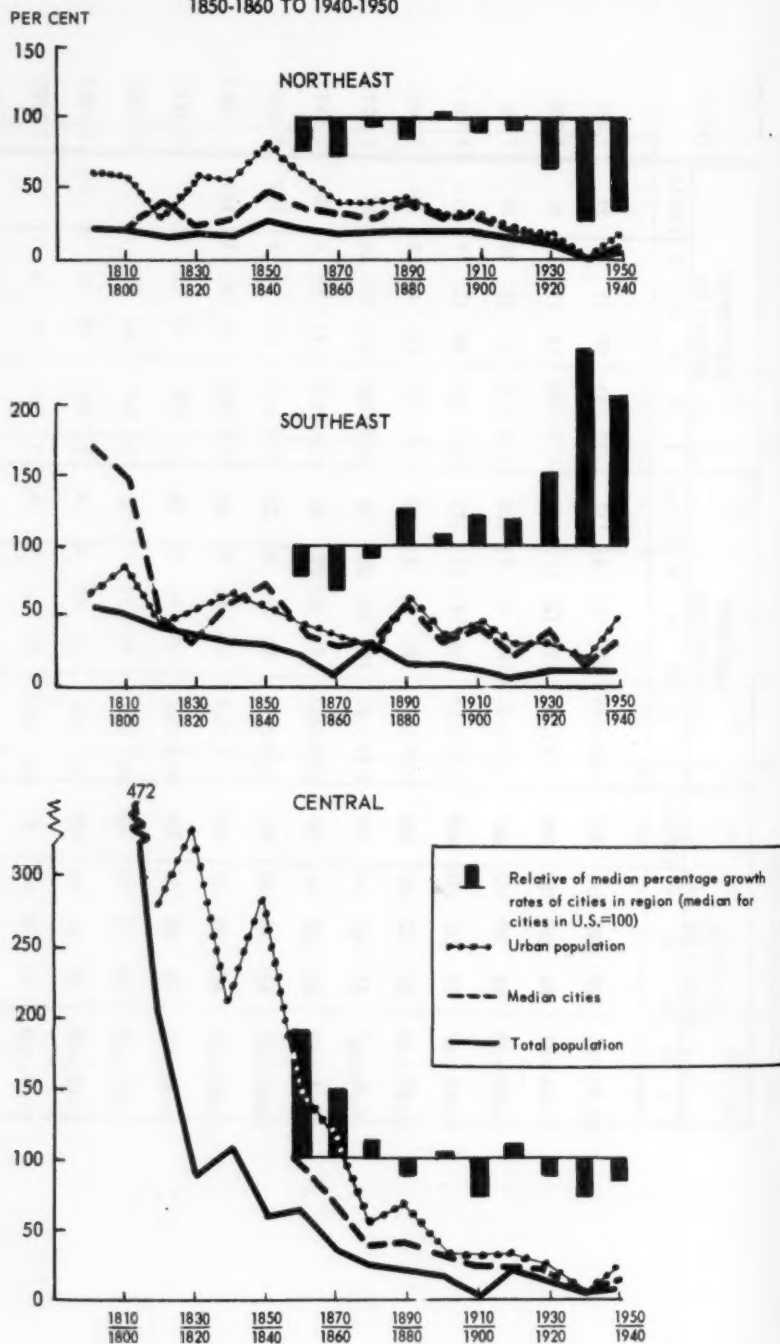
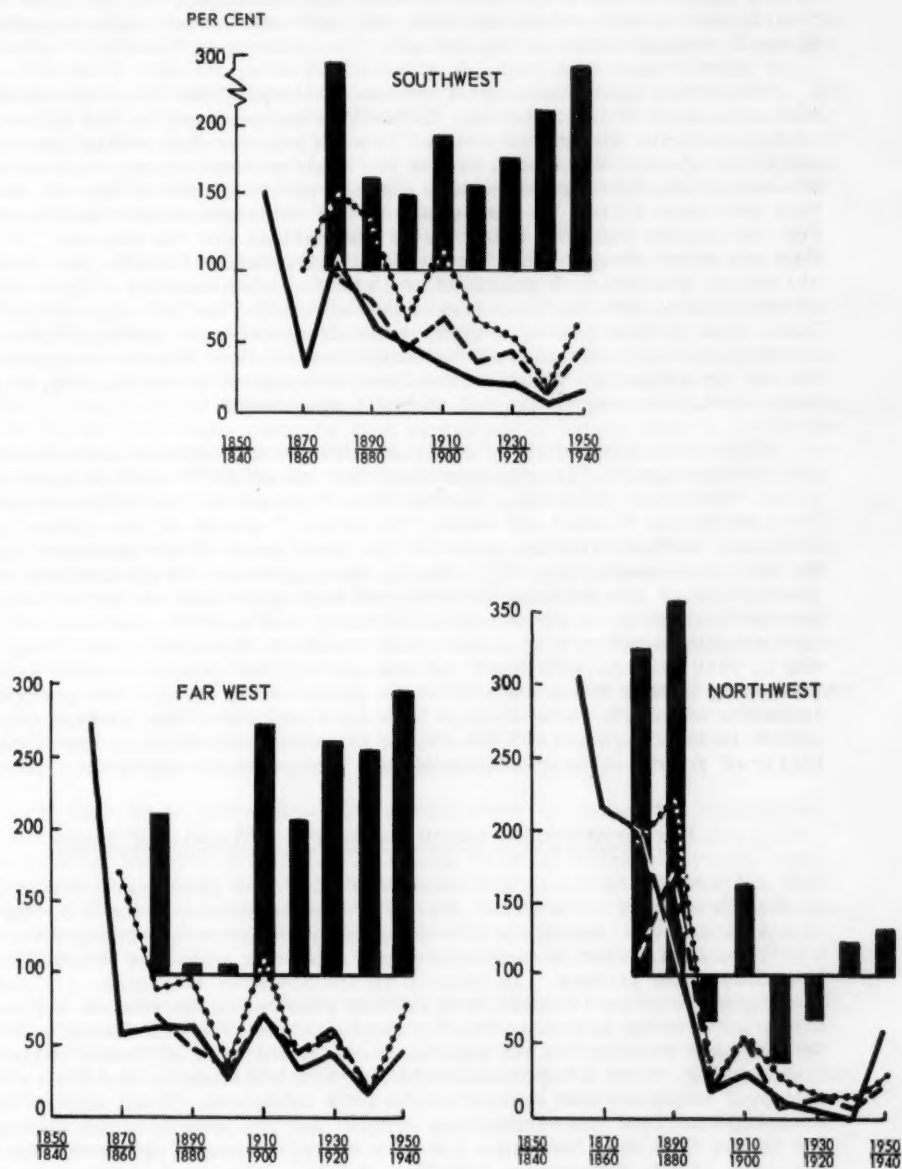


Figure 1.

PERCENTAGE GROWTH RATES OF TOTAL POPULATION AND "URBAN" POPULATION, AND MEDIAN OF PERCENTAGE GROWTH RATES OF U.S. CITIES 10,000 OR LARGER IN 1950, BY REGIONS, 1850-1860 TO 1940-1950  
(continued)



The pattern formed by the average growth rates of the cities in the different regions may be preceived in summary from the bars in Figure 1. They represent relatives computed by taking the median growth rates of the cities 10,000 or more in size in 1950 for each region as a proportion of the median growth rates of such cities in the United States as a whole for the ten decades, 1850-1860 to 1940-1950. From these relatives one may gain a quick impression of the average tendency in each region compared with the nation. One sees that the cities of the Southwest and Far West have grown with the highest average growth rates in all decades of their existence; that in the twentieth century these cities have been accompanied by the cities of the Southeast; that the Central region has produced cities with the stablest growth rates; and that the Northeast is the region of relatively slowest growing cities in the nation.

Study has also been made of the variability of the rates of change of the cities in each of the regions. Variability was measured by the interquartile range of the rates for the cities located in each region. The median and interquartile range for the cities of each region for a given decade were taken as relatives to the median and interquartile range for the cities of the nation for that decade. This procedure allows the comparison of the relatives of the interquartile ranges for the regions with the relatives of the medians for the regions. It appears from a scatter diagram that the degree of association between the level and variability of the rates of growth of the cities within regions is less than the degree of association between the two measures within the nation. Special circumstances local to a given region apparently tend occasionally to produce high growth rates for many cities, or low growth rates for most cities but considerable spreading, or similar situations in which the level and degree of variability of growth rates within the region are not strongly associated.

From this brief study of regional divergence in growth rates the following conclusions appear: (1) the growth of the cities in the nation shows marked regional divergence in rates. As the tide of growth in the different sections of the country has flooded and ebbed, the rates of growth of the cities located in them have shifted from the upper to the lower parts of the national distribution, but with much scattering. (2) Though, in a given decade in a region of rapidly growing cities the relative frequency of high growth rates for its cities is greater than it is in other regions growing less rapidly, yet some cities located in the region--cities that later reach 10,000 in size--may grow slowly or not at all in that decade. (3) 'New' regions and rapidly growing regions are characterized by cities the average of whose growth rates is high but unstable. (4) Retardation of growth rates through time is a feature of the average growth rates of cities in each region. (5) The degree of association between the level and variability of growth rates of cities appears lower within a region than within a nation.

## II. Growth Rates and Distance from Metropolitan Center

Differences in the growth rates of cities have also been studied by reference to the distance of cities from the large center nearest them. Throughout history cities have served as points of origin and destination of economic flows. Today, a metropolitan center is the sending and receiving point for a complex of flows of commodities and persons. In regards to the movement of people, it appears that the migration of individuals from a given point of dispersion to a given point of absorption varies directly with the two densities of population and inversely with the distance between the two points. Under conditions of fairly uniform population density, moves are predominately for short distances, and the relative frequency of moves becomes smaller as distance increases. Thus, cities typically draw migrants from the surrounding country as they grow from net in-migration, and losses from this territory are more or less recouped by moves from further distances [USHR; Ravenstein; Stouffer; Bright]. It is of interest in view of this evidence, to see how cities located at different distances from metropolitan center have grown.



The distance of each of the 1,262 cities under study was measured from the nearest metropolitan center as these centers existed in 1940. The metropolitan centers selected as reference points were 67 centers described by Donald J. Bogue [1950]. While no theoretical necessity dictates their choice, they form a list of centers selected by a common sense set of criteria as leading economic centers of the nation in 1940. Distance measured was straight line mileage upon a Rand McNally Standard Map of each state as given in the company's 1951 Commercial Atlas [1952]. Distance was measured from the estimated center of a given city to the estimated center of the nearest metropolitan center. The resulting data was obviously rough and unsatisfactory except to elicit general impressions. For example, several of the centers have not been metropolitan centers during the entire period. Also, "distance" as measured here is hardly more than illustrative. Its definition abstracts from all problems of route and mode of transportation and from all differences of topography, all natural barriers, lakes, swamps, etc. But although the list of cities is not satisfactory and the concept of distance is only illustrative, the measurements may still be useful for the simple purpose of seeing whether, on the average and over the decades, any noticeable patterns have developed in the differences displayed by the growth rates of the cities located at roughly different distances from these centers.

First of all, the density of places, that is, the number of places per unit area, declines with distance from center in each decade since 1790 as can be easily estimated from Table 2. But the median size of place does not decline with the same regularity as distance from center increases. Table 3 also shows the median size of city in each distance zone out from center for several decades from 1850 to 1950. Places of various sizes appear in each distance zone in each decade. But in each decade investigated during the past century, the median size of place in the 45 to 64 mile zone has been consistently larger than it is in the next nearer and next further distance zones. This finding reflects the more frequent incidence of places themselves centers of some economic importance at this medium distance from the leading centers throughout a century.

Table 2 also tells something about the increase in the number of the cities under study reported in the Census in each decade. In every decade except 1930 and 1940, increases in the number of cities were reported in all the distance zones out to 114 miles. From 1820 through 1880 the increase in number was greater in the distance zone from 25 to 64 miles from center. Since the decade ending in 1890 the increases in number have been larger in the 0-25 mile zone than in any other. The increases appear to occur as if, during the early decades of the nineteenth century, new cities were being scattered across the continent at fairly sizeable intervals of distance, while during the twentieth century there was a filling in with places of the area near existing centers.

The first fact to be noted about the growth rates of the cities located at different distances from the 67 metropolitan centers is their variability. In each distance zone in any decade there is a wide range of rates of growth, some cities growing slowly or not at all. Table 4 illustrates this fact for the decade 1940-1950. The table makes clear that while, in order to observe differences in growth rates between zones, we consider the average growth tendency in the zones, we ought not to forget that the averages hide this variability.

The growth in size of the cities located at different distances from the 67 metropolitan centers has been measured by the increase in the median size of place in the different distance zones and by the median of the percentage growth rate of the cities located in the different zones. Figure 2 shows the median decade rates for each decade during the last century, each plotted at the decade indicated, with lines connecting the decades merely to assist in identifying the different decade rates.

From 1850 through 1890 the cities located nearest the city limits of present metropolitan centers grew at a fairly steady percentage rate. This was the

**Table 2.** Increase each Decade, 1800-1950, in the Number of Cities 10,000 or Larger in 1950 Reported in the Census, the Cities Being Classified by Their Distance from the Nearest of 67 Metropolitan Centers in 1940

Year	Distance from Metropolitan Center in Miles										All Distance Zones		
	0 - 25		25 - 64		65 - 114		115 - 164		165 - 464		Each	Year	Cumulative
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent	In-crease	Per Cent	No. % in-crease
1790	25	44.6	20	35.7	9	16.1	2	3.6	-	-	56	100	56
1800	8	34.8	5	21.7	2	3.7	4	17.4	4	17.4	23	100	79 41.1
1810	8	36.4	6	27.3	5	22.7	2	9.1	1	4.5	22	100	101 27.8
1820	10	38.5	13	50.0	3	11.5	-	-	-	-	26	100	127 25.7
1830	11	33.3	15	45.4	5	15.2	2	6.1	-	-	33	100	160 26.0
1840	13	30.2	16	37.2	12	27.9	2	4.7	-	-	43	100	203 26.9
1850	42	26.9	58	37.2	35	22.4	15	9.6	6	3.8	156	100	359 76.8
1860	30	19.7	63	41.5	42	27.6	12	7.9	5	3.3	152	100	511 42.3
1870	33	21.7	58	38.2	43	28.3	13	8.6	5	3.3	152	100	663 29.7
1880	35	21.6	44	27.2	37	22.8	23	14.2	23	14.2	162	100	825 24.4
1890	34	30.6	21	18.9	25	22.5	13	11.7	18	16.2	111	100	936 13.4
1900	60	56.1	19	17.8	19	17.8	19	17.8	1	0.9	107	100	1043 11.4
1910	51	54.8	13	14.0	9	9.7	8	8.6	12	12.9	93	100	1136 8.9
1920	33	63.5	5	9.6	3	5.8	3	5.8	8	15.4	52	100	1188 4.6
1930	27	81.8	2	6.1	-	-	1	3.0	3	9.1	33	100	1221 2.8
1940	4	100.0	-	-	-	-	-	-	-	-	4	100	1225 0.3
1950	12	35.3	8	23.5	11	32.3	1	2.9	2	5.8	34	100	1259 2.8
	436		366		260		109		88		1,259		

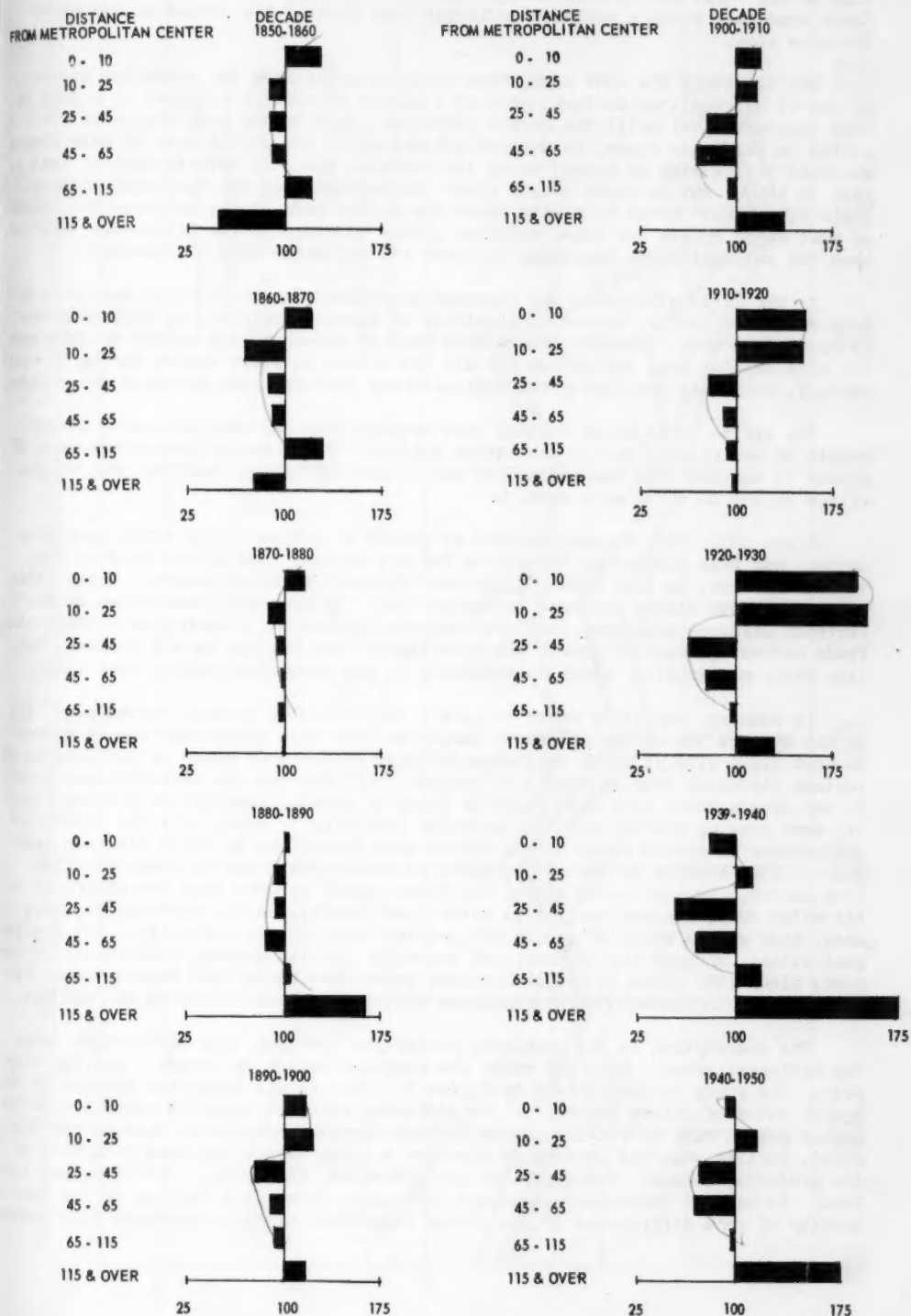
**Table 3.** Median Size in 1850, 1870, 1890-1940, of Cities 10,000 or Larger in 1950 in U. S. Found in Each Distance Zone from Nearest Metropolitan Center

Distance in Miles	1850	1870	1890	1900	1910	1920	1930	1940
0- 9	4,500	8,050	12,250	10,400	10,500	12,750	19,500	22,500
10- 24	3,800	5,900	6,500	6,900	7,600	11,000	15,000	16,200
25- 44	2,750	4,600	7,000	8,200	11,000	13,000	15,250	15,750
45- 64	3,200	4,700	7,500	9,000	11,200	13,800	17,000	18,200
65-113	3,100	3,800	6,200	7,200	9,700	13,000	16,800	18,000
114-464	2,400	2,000	4,400	5,400	8,000	9,800	13,000	15,000

**Table 4.** Number of Cities with Different Percentage Growth Rates, Classified by Distance from Metropolitan Center, 1940-1950

Percentage Rate of Growth	Distance from Metropolitan Center in Miles					
	0-9	10-25	25-44	45-64	65-114	115 and over
-25 to -50	1					
-0.1 to -25	24	22	17	23	22	6
0 to 4.9	34	20	31	35	29	11
5.0 to 9.9	15	22	28	29	37	20
10.0 to 24.9	38	57	57	57	71	44
25.0 to 49.9	21	23	24	23	48	57
50.0 to 99.9	21	29	15	11	30	36
100.0 to 249.9	13	26	5	3	10	19
250.0 to 499.9	4	7			1	1
500.0 to 999.9	1	2				
1000.0 and over						

Figure 2. Relatives of Median Per Cent Growth Rates for U. S. Cities  
10,000 or More in Size in 1950, Classified Decades 1850-1860 to 1940-1950  
 (All Distances = 100)



period of the most rapid increase in number and growth in size of all the cities under study. Since 1890, the median percentage rate of growth of the cities in the 0-9 mile zone has declined, but it remains among the highest. With the exception of the first two decades of the twentieth century, the cities in this distance zone have shown a median size larger than that of the cities in any other distance zone.

The cities in the next zone, from 10 to 25 miles from the estimated center of the 67 metropolitan centers, grew at a median rate which remained at a more or less constant level until the decade 1930-1940, when, along with the rates for cities in the other zones, it dropped off sharply. The median size of such places declined from a rank of second among the distance zones in 1870 to next to last in rank in 1950. But in every decade since the beginning of the twentieth century, these cities have grown at a rate above the median rate of all cities. The decade of most rapid growth for these suburban places occurred in the prosperous twenties, when the automobile was beginning to exert its influence upon the economy.

In the 25-44 mile zone, the increase in median size of city has been steady from decade to decade, second in stability of increase only to the median in the 45 to 64 mile zone. However, the median rate of growth of the cities in this zone has been smaller than the median for all cities in every decade during the past century, and it was smallest of the medians in any distance zone in four of the decades.

The cities 45-64 miles distant from metropolitan centers have shown steady growth in median size during the entire century. Their median percentage rate of growth is smaller than the median for all cities but not so small as that of the cities in the 25 to 44 mile zone.

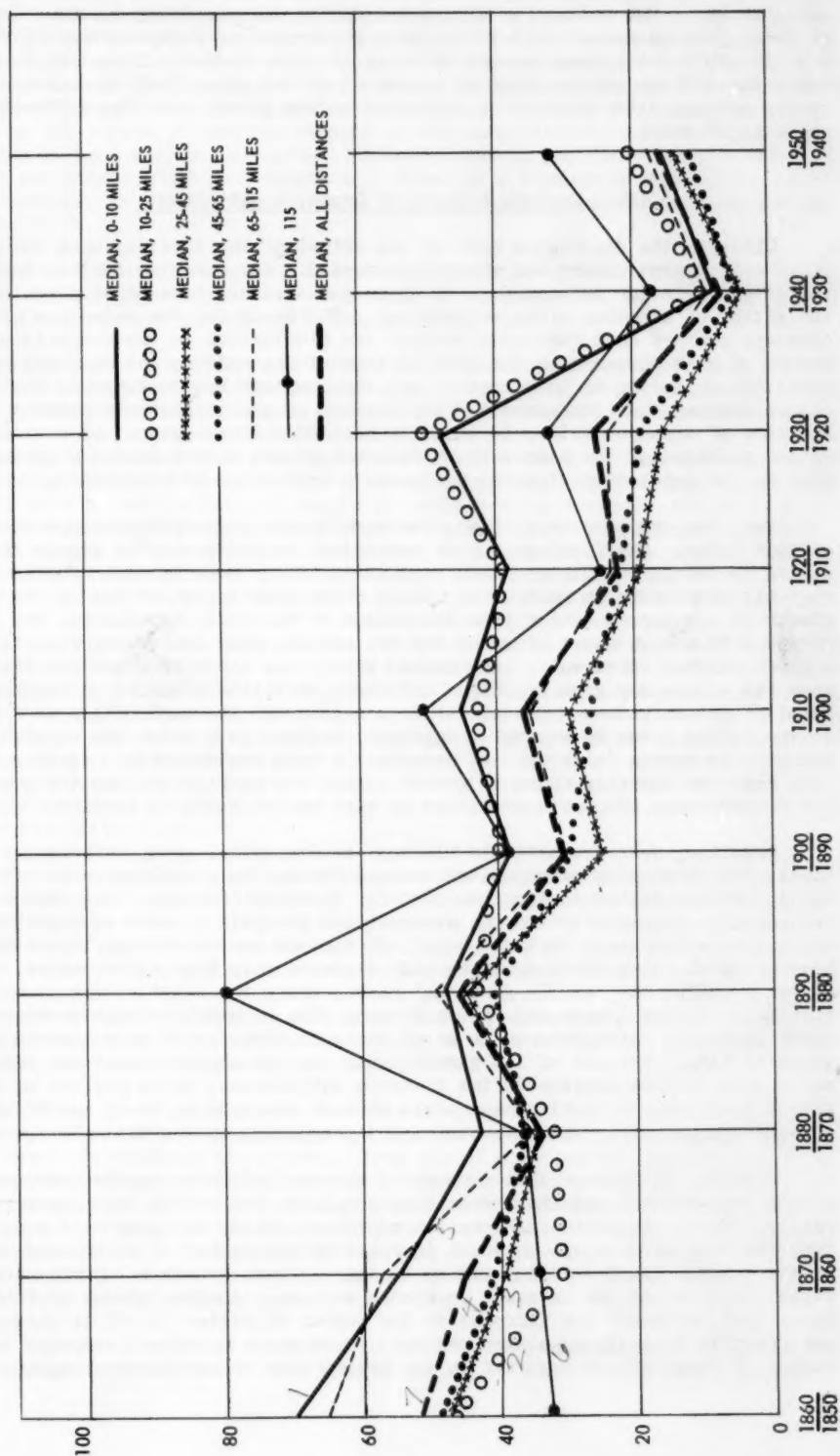
Since 1870-1880, the median rate of growth of cities 65-114 miles away from center has been closest to the median for all cities. The cities in this distance zone have, in this sense, displayed 'typical' rates of growth. These cities have also shown steady increase in median size. By contrast, the cities in the farthest distance zone have displayed extreme fluctuation in their growth tendencies. Their percentage rate of growth has been higher than average in all decades, but, like their median size, which is smallest, it has shown instability over time.

In summary, our study seems to permit the following general statements: (1) on the average the cities 10,000 or larger in 1950 have grown over the 16 census decades since 1790 at rates that show definite differences among cities located at various distances from metropolitan centers. (2) However, in each distance zone in any decade there is a wide range of rates of growth, some cities growing rapidly, some growing slowly, and some actually declining in size. (3) The pattern of differences in growth rates of the cities when classified by their distance from metropolitan centers is one of declining rates of growth out to about 45 miles from center. From 45 to 64 miles, one finds steady growth; then for cities 65 to 114 miles away, another decline in rates; and finally, in the farthest distance zone, high median rates of growth but greater than average stability. (4) The largest cities, through the decades, are generally located nearest to metropolitan centers; since 1880 cities in middle distance zones have become and remained next largest; cities far removed from metropolitan centers remain smallest, on the average.

The description in the preceding paragraphs obscures time differences among the different rates. When the rates are compared decade by decade, new facts appear. The study is facilitated by Figure 3. This figure shows the medians of the growth rates of cities located in the different distance zones as relatives to the median growth rate of all the cities without regard to distance. Let us consider, first, periods when the percentage rate for a given decade declined from that of the preceding decade. These periods are 1870-1880, 1890-1900, 1910-1920, and 1930-1940. In each of these periods except 1910-1920, there is a decline in the inequality of rate differences of the cities classified by their distance from centers.



Figure 3. Median of Per Cent Changes by Decades in Cities of Over 10,000 in 1950 by Distance from Metropolitan Centers



The decline in the inequality takes the form of a reduction of these rates that were far above the median for all cities during the preceding decade. In each of these decades except 1910-1920, there also occurred a depression--1873, 1893, and 1929-1933--with unemployment existing in major industrial centers.<sup>2</sup> By contrast the differences in rates of growth of cities classified by distance from center increased for decades of increased median growth over the differences in preceding decades.

### III. On Some Effects of Location upon Growth

Clearly, the discussion here of the effect of the location upon the growth of cities is preliminary and sharply condensed. For example, further understanding of the relation between size of place and distance from other place requires the attack of a number of major problems. The basis for the selection of major economic centers must take into account the fluctuation in the composition of the roster of such places over the life history of the nation, the shifting requirements for appearing on this roster, and the constant net increase in the number of cities meeting the requirements. The measure of distance should account for route and mode of transportation, if it is to achieve a closer aspect of reality. The entire question of the manner in which urban growth occurs behind a moving frontier as the population migrates westward is left untouched in detail.

Yet, for the purpose at hand, the results provided by the discussion may be of some value. Our findings may be summarized as follows: The growth of the cities in the United States which reached 10,000 or more in size by 1950 has shown regional divergence in rates; we find a difference in the median of the rates of growth of a region's cities from the median of the nation's cities. But even in a region with a high level of rates for its cities, some cities may fail to grow in a given decade; conversely, in a region with a low level of rates for its cities, some few cities may grow rapidly. And there is little association between the level of growth rates of the cities in a region and the variability of the rates. As the nation grows by westward migration, regions into which the population, on balance, is moving (although not necessarily such regions alone) contain cities with high but unstable rates of growth. With the passage of time the average of the decade rates of growth of cities in each region tends to decline.

Meantime, over the nation's history, as its cities grow, differences appear within the developing metropolitan communities in the growth rates of cities located at various distances from the center. These differences, too, like those among the regions, appear only 'on the average' and in spite of much variability of rates for cities within each distance zone. It appears on the average that cities that have grown at rates which decrease with distance away from major center, up to what might be called the 'middle distance' zones, where the relative frequency is large of finding cities larger and faster growing than in nearby distance zones. Differences in growth rates between zones of distance from center seem also to show changes with time. Periods of low growth level for the population of the nation as a whole seem to show decline in the distance differences, while periods of high growth level for the nation as a whole show an increase in them, and these periods coincide respectively with depression and prosperity in the nation's economy.

Finally, it appears that throughout the nation's history the movement of the population westward and the movement of people to the cities took place concurrently. While the westward expansion continued apace, the growth of population took the form as well of continual increase in the number of cities and of growth on the average among existing cities in all regions, growth being more frequently rapid among the cities in newly populated regions. Another glance at Table 2 shows that, although the increase in the number of cities 10,000 or larger in 1950 was greatest in newly populated regions, there was a continual increase in the number of these cities reported in the Census each decade in each region.

The findings of this study may be interpreted in a manner consistent with the hypothesis of the population system as a density system made up of centers of different sizes and their oriented populations. The cities being focal points of the origin and destination of flows of commodities and persons, the centers within the system compete for influence over the surrounding population. Differences in the rates of growth of cities located in different parts of the system may be viewed as the result of varying success in the competition for influence. Thus, one finds in each region and in each distance zone in any decade cities which are growing and cities which are declining. There is a freedom of individual action on the part of the cities which implies for each city the alternative of failure to grow.

This view finds the support of the historian Arthur Schlesinger, who found the tendency in operation in the early days of the Republic, and he lends credence to the interpretation as follows [1940, p. 49]:

"As the large American towns gained in corporate consciousness they reached out for dependent territories and engaged in contests with one another for economic dominion.....These raw western towns (beyond the Appalachians) at first served as distributing points for commodities between the seaboard and the interior; but they soon became marts where the local manufacturer and the country dweller plied a trade to mutual advantage. Up and down the Ohio Valley many a rude settlement sought to emulate their example; the ambition to be a city dazzled nearly every cluster of log huts. The Indiana pioneers, for example, hopefully named their tiny hamlets...New Philadelphia, New Paris, even New Pekin.....Note also Burns City, Cambridge City, Clay City, Coal City, Lincoln City, Hartford City, Michigan City, Monroe City, Rome City, Shirley City, and Switz City, not to mention numerous place names ending in 'town', 'burg', 'port', and 'ville'. Few of these 'cities' ever attained the minimum census definition of a city (2,500 inhabitants). In J. K. Paulding's novel, *Westward Ho!* (New York, 1832), II, 179, Zeno Paddock, coming upon one of these aspiring midwestern settlements, found 'on the very spot where the court house stood on the map, a flock of wild turkeys gobbling like so many lawyers...but the founder of New Pekin swore it was destined to be the great mart of the West, to cut out St. Louis, Cincinnati, and New Orleans, and to realize the most glorious speculation that was ever conceived by the sagacity or believed by the faith of man.'"

Consistent with this interpretation, we may describe the growth of the population as follows: as the population of the nation grows, moving in general to the west and increasing in density to the east, new towns spring up at points to the east where population density has been increasing for some time,<sup>3</sup> and to the west at points of locational advantage. But in general, towns appear apparently at random in space, more springing up in a given territory to the west, relative to the number existing, than to the east. In a progressive economy, new towns, like new industries, are continually arising to meet new needs, and occasionally old towns, like old industries, are rejuvenated.

At first, one might suppose, the rate of growth of such towns is exhilarating in its rapidity. But as the population increases, the town must expand its range of influence to continue its growth. From any of a number of causes related to locational advantage, political windfall, superior ability of its citizenry, etc., but on the average to the influence of distance from leading center in all parts of the nation, a given city, 'favored by fortune', gains ascendancy over its immediate competitors. To continue its growth, it must expand its range of influence by stages to overreach the corresponding territory of places nearby with lesser ranges of influence.

As technology releases workers from agriculture, migration, on balance, proceeds towards the cities. The flow of people is itself influenced by the size

of the destinating center and the distance intervening from point of departure. The influx of migrants to the largest centers produces in them, on the average, the highest rates of growth, in centers nearby them the next highest growth rates; and so on, until a distance is reached where the influence of centers subsidiary to the largest metropolitan centers is strong enough to divert the migrating stream. From our evidence, this appears to be at distances around 45 to 64 miles from center on the average. The distance at which the stream is diverted seems to vary with time and mode of transportation as well as with size of competing centers, thus appearing in summary statistics as a zone. In times of prosperity the pull of the centers towards migrants appears to be greater, judging from the heightened distance differences in the growth rates of the cities at those times, while in periods of depression the distance differentials appear to decline as the growth of cities located at all distances from metropolis falls off. This finding tends to confirm evidence that rural-urban migration is strongly affected by cyclical fluctuations in business.

Thus, the cities, looked upon as points of absorption and dispersion of flows of people and services, form themselves into a system and grow in a manner that produces characteristic changes in rates associated with location, while allowing for increasing flexibility in the relations among the places of different types. Considering the evidence of this article together with evidence presented in the last issue of this journal of stability in the distributions of the growth rates of cities, we can see how the organization of our enterprise economic system places constraints upon the growth of cities in the system but not necessarily upon any particular given member of the system. And we can see how the differing growth rates of the cities may be interpreted as depicting the degree of success with which they each compete for influence or proportion of total urban economic activity.

Carl H. Madden

Federal Reserve Bank of New York

#### Notes

1. An adaptation of the regions used in the study Regional Trends in the United States Economy [USDC, 1951] is employed here. The six regions resulting have the following composition. NORTHEAST: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, Delaware, District of Columbia, Maryland, New Jersey, New York, Pennsylvania, West Virginia. SOUTHEAST: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia. SOUTHWEST: Arizona, New Mexico, Oklahoma, Texas. FAR WEST: California, Nevada, Oregon, Washington. CENTRAL: Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, Wisconsin. NORTHWEST: Colorado, Idaho, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, Wyoming.
2. The decade of the First World War was a special case in that during this time, there was a temporary resurgence of agricultural migration. "The cry 'Wheat will win the War' sent thousands to the rangelands of the Great Plains. Hundreds of thousands of acres of grassland were plowed for the first time". [NRC 1938, p. 83].
3. Evidence for this statement is visible to the eye in Francis Walter's series of maps [1903].



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This paper is an exploratory examination of the possibilities of economic development in the agricultural sectors of semi-developed economies with limited agricultural land and peasant-type farming. Exploration of these possibilities, of the controlling factors, and of the probable difficulties is a basic prerequisite in formulating a meaningful development policy.

Fundamentally, the problem faced by countries which are short of land is raised by diminishing returns. However, this problem is not insoluble. Investment in research, and the advancement and diffusion of knowledge make possible changes in the character of the soil and an increase in productivity. The experience of the United States, where the volume of farm production between 1910 and 1945 has increased by 70 per cent without any comparable increase in acreage, is strong evidence of this possibility. The scarcity of agricultural land does not seem to be an impassable obstacle to improving the situation. Technical advances have, to a certain extent, made economic the substitution of capital for both land and labor [Schultz 1951].

To what extent a similar development can proceed in an economically underdeveloped country is a question requiring investigation in each particular case. However, it would seem that these investigations can be approached with certain hypotheses in mind. This paper attempts to develop some such hypotheses from a study of Greek agriculture.<sup>1</sup>

The first task in searching for hypotheses is to establish a comprehensive and meaningful classification of underdeveloped countries that reflects the stage of their economic and social development. The commonly used taxonomy based on real per capita income overstates the material aspect at the expense of other equally important social and institutional considerations. There are countries whose total income is relatively high due to their natural resource endowment and their successful exploitation thereof. In terms of other features, such as institutional structure and social and cultural attitudes and rates of change, they might be more properly classified as underdeveloped. (Venezuela could be mentioned here as a typical case in point.)

By the income criterion, Greece should be placed in the low income category. But it differs from the usual type of underdeveloped area in the degree of its dependence on primary production, the extent of development in basic social and economic organizations, the composition and attitude of the labor force, and the nature of its economic problems. A distinction drawn along these lines supports its classification as a semi-developed country.

As such, it presents certain features characteristic to both advanced and underdeveloped countries. It has become industrialized to a certain extent, with industrial employment of the Western type in both its labor force and capital equipment. It is still dependent to a large extent on imports for major foodstuff items, and monetary, exchange, and trade problems are persistently present. On the other hand, the predominance of agricultural activity, the low income per capita, the inferior technology, and the high potential rate of population growth are features of an underdeveloped economy.

In this setting, agriculture is but a part of Greece's economic development problem. Under present conditions, however, it seems to be a key element in the overall problem and in many other problems of a shorter-run nature. The two big questions to be asked are: (1) how far is agriculture susceptible to development, given the limitations imposed by conditions in the supply of land resources; (2) in what direction should development efforts concentrate.

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\* I am greatly indebted to my colleague Lorne T. Sonley for many helpful suggestions and comments.

## I

To answer these questions, we shall first look at the present configuration of farm resource use. The dominant fact is that land supply is virtually absolutely inelastic, as already noted. Against this situation the supply of farm labor, in absolute terms, is still increasing. This in spite of the fact that in relative terms a slow change in the structure and a re-allocation of the labor resources have been in evidence during the last 30 years. But the much higher rate of growth in farm population as against urban, and the failure of the non-farm sector to absorb a larger amount of the farm labor surplus have combined to make the farm labor supply persistently redundant.

The pressure of the expanding labor force found, in the past, an outlet in the expansion of agricultural land in spite of the country's limited land resources. Farm policy has been occupied with land expansion efforts, partly as a means toward self-sufficiency in food, and partly for alleviating the labor pressure. Moreover, the successive land reforms were guided more by social goals of farm ownership than by economic objectives of efficiency in production.

Farm capital resources, on the other hand, consist primarily of land and improvements in land. Improvements mainly in perennial plants, but even this advance is limited, because land resources are employed mainly in grain production as a result of the population pressure. No major changes seem to have occurred in the pattern of land utilization during the last 25 to 30 years.

As far as productivity is concerned, some improvement did occur during the same period. However, this was not the result of increasing productivity in land or other capital assets; it has been rather the outcome of an expansion in farm land relative to the supply of farm labor: that is, the productivity increase resulted from an improvement in the conditions of employment of the farm labor. This indicates also that land expansion occurred toward less productive submarginal and grazing lands, and not toward more productive areas.

In respect to the utilization of farm labor, the empirical evidence is that imputed return to labor is not far below the returns to non-farm labor of similar skills. This suggests that with the given state of technology in farming no major allocative inefficiency exists in the use of the human resources in agriculture.<sup>2</sup> The large difference observed between farm and lower-skill non-farm labor on the one hand, and between the other groups of skilled and professional labor on the other, is the result partly of difference in training, and partly of misallocation within the non-farm labor structure. Moreover, the widespread existence of organized non-competing groups in the non-farm sector contributes largely to this difference. It is this differential that makes for the existing large difference in the per capita income distribution between the two sectors of the economy.<sup>3</sup> On the other hand, the empirical evidence is that marginal productivity of farm labor is quite below the going wage rates paid for hired farm labor.

The fact that a considerable surplus of labor exists on farms does not imply that it is also readily available for transfer to other lines of activities, even were industrial expansion fast enough to absorb it. Under the predominantly self-sufficient type of farming, a large part of this labor is engaged in producing farm inputs, in processing farm products on the farm, or in marketing a part of the farm produce. In addition, seasonal peaks in the need for farm labor considerably complicate the existing labor situation. Any sizeable transfer of labor resources out of agriculture, therefore, depends upon prior improvements in the pattern of farm production in the direction of commercialization, and by improvements in industries serving agriculture with producer goods and services.

With respect to the productivity of capital, including agricultural land, the evidence suggests very low productivity. Average returns to farm capital are far below its market price as measured by the market interest rates on long term loans. The explanation is found in the inferior technology and the low productivity assets in use; the highly capitalized land values; and the overcapitalization within the farm unit because of the usual technical indivisibilities resulting from the small scale of peasant type farming.

## II

In this setting and with the described conditions in land availability, little can be done toward improving the situation through an increase in land supply. Land expansion has approached its limits. Any improvement in this direction is unlikely, except at prohibitively high cost. Similarly, no major re-allocation of the human resources that would change factor combinations is possible in a relatively short period, since this is conditioned by the rate of expansion in non-farm industries and by the above-mentioned need for prior changes in the present pattern of farming. Given these limitations, the only remaining way to improve productivity is through capital development, changing technology, and a more efficient internal organization. However, improvements in organization and technology represent in the final analysis another aspect of capital investment, either in terms of adapting new technology, or in the form of replacing existing low-efficiency capital assets. Our inquiry, therefore, must be directed toward the possibility of achieving development through capital investment.

Looking at the problem from this point of view, there are three major factors that need to be considered: (1) the capacity of agriculture as an industry to efficiently absorb capital investment; (2) the availability of capital, both in terms of producer goods and "financial availability"; and (3) the allocative mechanism and the direction that investment should take within agriculture.

The absorptive capacity of Greek agriculture as a whole does not appear, at first glance, to be a major obstacle in this respect. In fact, demand for loanable funds seems to exceed what productivity in farming would justify. This, evidently, is the result of the aforementioned conditions in farm labor supply and the relationship between demand for income and demand for productive resources. On the other hand, social and cultural attitudes, observed elsewhere, that forestall the functioning of this motivation for increased income are absent.<sup>4</sup> However, any further quantitative increase in capital assets will run into sharply diminishing returns because of limitations in the supply of land.

The problem, therefore, lies more in qualitative changes in the form of organizational and technological advances which would offset decreasing returns rather than in quantitative changes in capital assets. And from this standpoint, the question centers on the ability of the individual farm to absorb an increased amount of investment in new and more efficient lines of production. Viewing this particular point, the following limitational factors seem to be closely related to the possibilities of increasing both the amount and the efficiency of new investment:

(1) Cost and limits of changing technology. Changes in techniques of production involve, to a sizeable extent, changes in the form of capital assets presently employed. This, in turn, implies a considerable cost in terms of obsolescence and mobility. The burden of such a cost is mainly dependent on the possibility of speeding up amortization of the non-permanent resources via the income stream which these resources produce [Hayek 1941, p. 327; Knight 1935, p. 19]. Low productivity and income peasant farms cannot easily afford to bear such a cost. This raises more strongly the question of both total requirements and financial availability of capital. To improve absorptive capacity in this respect, a part perhaps of the cost has to be transferred into the economy as a whole, or to be spread over an appropriate period of time through credit policy adjustments. Moreover, the elasticity of substitution between factors of production, as affected by alternative employment opportunities and organizational structure, puts further limits to technological changes. This is particularly the case with the substitution of capital for labor, in labor-saving mechanization. Unavailability of non-farm employment opportunities and the cost of transfer out of agriculture limit the possibilities of such a substitution for the peasant farm family. The situation could be relieved by expanding employment opportunities within the farm toward complementary lines of production (livestock, etc.). The main difficulty perhaps lies in technology based on the use of mechanical power. Organizational obstacles such as the small size and fragmentation of farm holdings and technical indivisibilities make difficult the introduction of such technology. Nor is consolidation of the holdings an easy problem. Absorptive capacity from this point of view may be found in technical advances which do



not generate, and are affected the least by, organizational changes. For instance, fertilizers, improved seeds, animals, feeds, etc., offer considerable opportunities for capital investment in terms of variable productive services, without significant cost due to structural changes; or mechanization not associated with basic changes in labor requirements, and/or in cooperative undertakings. It is in such directions that a considerable margin of absorptive capacity may be found in Greek agriculture.

(2) Uncertainty about the returns of new types of investment and about the market conditions for the product. Farmers' ignorance in this respect and their reluctance to undertake risks is revealed by the tendency to adapt capital structure to risk aversion; by their difficulty in adjusting to changing market conditions; and by their pressure to shift the cost of such uncertainty toward the government.<sup>5</sup> In countries like Greece, the high demand for grains has driven production into extensive types of farming. Shifts to more efficient alternative methods and products would involve costly changes and uncertainties about the disposal of the produce.

(3) Possibilities of increasing operative specialization within agriculture. In small, peasant type farming, production becomes almost self-sufficient. Most of the farm inputs are produced on the farm, and the saving and investment functions almost coincide. It is this peculiarity that leads to misuse of capital and to the phenomenon of a relatively low absorptive capacity while capital shortage is still high [Warriner 1939, p. 165]. Operative specialization, through concentration of the farm family's activity on primary operations, would make possible intensification in land use, and hence efficient employment of a greater quantity of labor per unit of land, and of a larger amount of capital outlays. Such a change, however, means a transfer of certain processing activities from the farm to the factory as well as a partial transfer of transportation and hauling work to the commercial sector. It means, in other words, an increasing commercialization and dependency of the farm-firm on the market for both producer goods and farm produce.

(4) Output produced is another factor which has direct effect on the degree of capital accumulation in farming. Under a grain producing farming pattern most farmers' savings have little outlet except in buying more land; this does not increase productive assets, but merely land values. To stimulate absorptive capacity in investment, shifts to appropriate kinds of products may prove necessary.

(5) The market outlets and organization. Market outlet for the expanding farm produce should not constitute a serious obstacle for an underdeveloped area where income elasticity for food is comparatively high. Income elasticity for food in Greece, for instance, is estimated at 0.75 on the average, and at 0.85 for the lower income brackets. The problem remains, however, for export farm products and raw materials. The crucial element of the market problem is mainly one of improving marketing facilities and similar services. Inefficiencies in integration of manufacturing and distributing functions deprive farmers of a ready demand for their products. Marketing becomes highly seasonal and middlemen depend upon high margins of profits to offset the low turnover. The consequence is increased demand, on the part of the farmers, for price support commodity loans, which very often results in diverting both demand and capital funds away from actually productive uses.

(6) Level of managerial skills. Managerial ability is the fundamental element in allocating and combining factors. It is natural for an agriculture with a large number of peasant farmers of low educational level to suffer from scarcity of entrepreneurial resources. As a result, not only the volume of capital-demanding innovations is restricted but also capital resources and technical knowledge are misused. It is from this point of view that farm operators' managerial skills condition the capacity of agriculture to absorb efficiently a larger amount of investment.

Most of these controlling factors, if applied to the conditions of Greek agriculture, indicate that its ability to absorb capital effectively is not very promising, unless positive policy action is taken to overcome these deterrents.

The second factor conditioning the possibility of development is the availability of capital. This refers both to physical and financial forms. Availability, quality,

and prices of producer goods, along with their accessibility to farmers, are the elements that ultimately decide the kind of investment, the technology to be used, and the level of profitability. This means that development in industries serving agriculture is a key factor for the growth and integration of agriculture into a specialized exchange economy. Coordinated development in other sectors of the economy is fundamental, if manufactured producer goods are to be available for the necessary technological and related changes in agriculture.

From this point of view Greek agriculture is in an unfavorable position. It has to rely primarily on imports of producer goods and hence depends on the conditions prevailing in the country's balance of payments. Developed domestic manufacturing industries have been mainly oriented toward consumer goods, with the partial exception of commercial fertilizers.

Moreover, prices at which manufactured farm inputs are available to the Greek farmer are relatively high. Terms of trade from this point of view are quite unfavorable for the farmer. Commercial fertilizers, for instance, cost the Greek farmer three times as much as they cost British or German farmers and twice what they cost the French farmer. This high cost of manufactured inputs adversely affects the rate of marginal efficiency of the particular investment and induces farmers to use less efficient inputs produced on the farm. The peasant, self-sufficient type of farming is thus perpetuated.

Monopolistic practices of the highly tariff-protected domestic industry, its lack of internal economic diversification, and its inefficient scale of operation intensify this unfavorable situation for agriculture. Empirical information for the last 20 years shows that increasing commercialization in farm production goes along with rising unit-costs in real terms. Moreover, restrictions on the availability of funds limit effective demand for producer goods on the part of the farmers, which in turn becomes another major obstacle toward the development of efficient industries serving agriculture.

Availability of financial capital severely controls further the development possibilities. It is financial availability that determines: (1) the farm-firm's productive response to market conditions, particularly in a farm economy of small owned units; (2) intensiveness of land use; (3) possibilities of investing in more efficient and more profitable lines of production (this involves the overcoming of financial indivisibilities, a major problem for low-income farm operators); (4) possibilities of changing and adjusting technology; and (5) mobility of capital assets among farm units. The lack, for instance, of an organized market for long term mortgage farm credit and the lack of accumulation of adequate liquid funds are major obstacles toward a voluntary farm consolidation in Greek agriculture, and contribute heavily to forestalling the movement of employed resources.<sup>5</sup>

The question of availability of capital has been crucial to Greek agriculture and farm policy for many years. It has been acute because: (1) the extensive land reform and its consequences (the number of independent farm operators was increased by more than 30 per cent because of the land reform in the 1920's); (2) the excess of labor supply and the demand for complementary capital resources as a means of drawing some income from farm employment; (3) the increasing intensification of land use and commercialization of certain farm activities. This brings up the question of saving and savings utilization, and the possibility of financing from non-farm sources.

Savings potentialities in Greek agriculture, and hence possibilities of self-financing, cannot be described as promising under present conditions. The rate of savings is quite low, around 4 per cent of the farm income in terms of money savings (i.e., savings which appear in investment financed through the market mechanism). The figure does not include all direct additions to farmers' stock of operating capital, hoarding, or physical accrual to farm capital assets. Such additions are sizeable in a peasant farm economy of small ownership, and regional surveys indicate a high rate of savings in this form, that is, much higher than the cited figure. However, money savings are what count for the purpose of changing technology and forms of capital assets.

Savings possibilities, as determined by the income per capita, are very limited, since 70 to 80 per cent of the income of an average farm family is allotted to food

expenditures. Moreover, the high instability of money savings (because of the high rate of variation in yields and prices of Greek farm products) is another adverse factor in this context. Year-to-year fluctuations in crop production during the 25 pre-World War II years ranged from 12 to 20 per cent, going up to 40 per cent for some crops; while prices for major farm export products showed an average fluctuation of 19 to 24 per cent.

On the other hand, empirical information about the consumption-savings function of the specific individual farm households shows that farm families with sufficient income have a relatively higher propensity to save than the national average. This indicates that the introduction of productive efficiencies that would improve the level of farm income might create a favorable situation for capital accumulation in the agricultural sector.

The observed transfer of income out of agriculture further restricts the possibility of self-financing. Such a transfer usually takes place through government taxation and adverse terms of trade. Greek agriculture is undergoing such a transfer on a sizeable scale. This problem becomes greater during a period of development, when movement of population out of agriculture is accompanied by a transfer of accumulated financial assets to the non-farm sector. Moreover, the comparatively higher returns to capital investment in the non-farm sector induce the flow of savings out of agriculture. Of course, under normal circumstances such a transfer, when associated with increasing efficiency in farm production, becomes an important source of financing industrialization, and as such represents agriculture's contribution to economic development.

To conclude, available empirical evidence in Greek agriculture suggests that very few possibilities exist for self-financing major changes. Under these circumstances, outside financing remains as the only alternative.

Overall saving potentialities in Greece are low at the present level of real income. Nor does the situation in capital funds offer encouraging possibilities for financing agricultural development from domestic sources. The overall rate of financially available savings in pre-World War II normal years hardly exceeded 5 per cent of the total national income. Post-war data indicate that the rate of investment in Greece was completely dependent upon foreign aid. Any increase in productivity was absorbed by increases in consumption. Although this phenomenon might have been justified during the immediate post-war years, its continuation defeats the goal of development and becomes a serious handicap for a self-generating process of capital formation.

The considerable inequality that exists in the distribution of personal income ought to be a favorable condition for savings accumulation. However, savings are concentrated in certain groups and they are subject to a considerable flight into foreign markets (or to gold hoards) as political and economic conditions change. Under such circumstances Greek agriculture has to rely to a considerable extent on foreign financing for its major improvements.

Furthermore, low farm productivity and returns to capital make it difficult for agriculture to draw capital funds in a competitive way and it has to rely mostly on government subsidized financing. Inability of the farmers in the past to pay off their loans, and their agitation for low interest credit always are traceable to low productivity. Attempts to cope with this situation by adjusting the cost of credit to the conditions of productivity through subsidization often contribute to the waste of capital funds rather than to the solution of the real problem. In contrast, increasing the productivity of new investment by combining it with improved technology is clearly a preferable policy, and indeed the only way that agriculture's competitive ability to draw loanable funds can be improved.

### III

Even with financial capital available, the solution of the problem would not be complete under conditions similar to those prevailing in Greek agriculture. In a farm economy dominated by peasant type farming, the market for fixed capital resources is absent or badly organized, and the price mechanism for productive factors does not

efficiently allocate existing resources. Scarcity of capital, on the other hand, creates problems of priority which cannot be handled satisfactorily by the market mechanism.

Therefore, in underdeveloped economies with low income, the problem is not merely one of improving capital accumulation by raising the rate of savings, and/or by outside financed investment. The canalization of investment into productive capital formation is equally important. Misutilization and misdirection of capital funds in Greek agriculture (and in the economy in general) seem to be quite extensive and represent another serious obstacle to growth, as is probably the case with most underdeveloped areas.

The lack of knowledge on the part of the farmers, the absence of readily accessible investment outlets, and the peasant structure of the large part of the farm activity are among the important factors contributing to the misuse of funds. Savings usually are invested in land ownership and improvements; or in livestock and other established types of farm assets; or in dwellings and durable household goods. These lines of investment are ones of very low productivity. Another outlet is that of hoarding. The high rate of hoarding is the natural result of both ignorance and the high liquidity preference which low-income farmers usually carry on precautionary grounds. Lack of a market for easy liquidation of farm assets, or lack of ready access to borrowing in case of contingencies, accentuate still further the degree of "felt" insecurity and lead farmers to both a relatively high rate of savings and a high ratio of hoarding.

Profitable opportunities for investment in agriculture are restricted by the above mentioned controlling factors. On the other hand, investment in cooperative commercialized operations is very limited under the existing organizational structure of the Greek cooperative system. Cooperative organization is based more on the principles of solidarity and less on the economic motives of profit-making, business-like organizations.<sup>7</sup>

The widespread cooperative system<sup>8</sup> of farm organizations has not proved adequate in serving the purpose of capital development. In its final form, being highly centralized and government controlled, the system undoubtedly presents certain organizational advantages for the application of a controlled financing policy for development purposes. Its weaknesses seem to lie primarily in its way of operation and the lack of managerial skills. Farm cooperatives fulfill their purpose as economic institutions as long as they utilize scarce capital and technology and provide managerial leadership which small farm-firms cannot afford. Improvements in their functioning should be based on improvements in internal decisions and scale of operations. Better managerial skills and changes that would establish adequate economic motives are the most important factors in this context, as development elsewhere has shown. The monopolistic fostering of the farm organizations exercised by government has to be eliminated in order to make possible the functioning of the cost mechanism as a disciplinary force for efficiency in the use of productive resources, and to force cooperative organizations into a more efficient way of operation.

To overcome such obstacles in the direction of investment, appropriate policy in farm financing is of great importance. Farm finance policy in Greece has been highly dominated by the objectives of social goals as in many other countries. To achieve development, farm financing has to be directed toward the economic goals of improving efficiency in the use of resources and inducing economic growth in terms of capital formation and technological advances. Until now farm financing has been directed toward short term purposes and based on government subsidized credit and financing from the central banking agency. Farm credit has been aimed more toward production and commodity price support loans rather than toward effectuating productive changes in agriculture. The former type of loans absorbed almost 95 per cent of the total financing during the last 20 years, on the average. And this in spite of the fact that through 1939 almost one-half of the loanable funds available in the farm credit organization were long-term types.

This situation must be attributed partly to the greater demand for credit to meet production expenses and credit for marketing of the farm produce; but it reveals also that finance policy increasingly ignored the productivity criterion and the resulting tendency toward misuse of capital funds. Such a policy has also derived from the established monopolistic situation in the market of farm credit. This situation retards the flow of short term funds into agriculture from private sources, despite the fact that



short term marketing credit needs may be equally well served by commercial financial organizations, at least for a large number of farm units and farm organizations. Moreover, highly subsidized short term credit and financing for price support purposes tend to perpetuate existing inefficiencies, and to support a consumption level higher than real farm productivity warrants. As a result of the credit policy, then, no significant structural changes have been induced in the past in Greek agriculture.

The additional important point in this respect is the inflationary impact which excessive short term financing in agriculture may have on the economy as a whole. This pressure develops especially when financing is drawn from the central bank and the farm economy constitutes the major sector of economic activity. The phenomenon was particularly evidenced in Greece in the post-war years, when almost 90 per cent of the farm financing was drawn from the central bank, and farm credit absorbed the greatest part of the total financing of this institution. The problem arises from the difficulty of determining the line of distinction between production expenses and consumption credit. This is especially the case when the farm activity absorbing finance is highly labor using, and when financing is largely used to cover farm family wages. As was pointed out above, marginal productivity of farm labor in Greek agriculture is considerably below the wage rate for hired farm labor. A financing greater than merited by productivity turns lending into a means of supporting an unduly high level of consumption. This, with conditions of high propensities to consume and import as in Greece multiplies toward further destabilizing repercussions for the economy as a whole.

The resultant question for an agriculture with similar conditions to those of Greece is not only one of a shortage of capital funds but also one of directing financing toward the real requirements. Such a controlled financing renders itself a quite effective implement of development policy under certain organizational setups. It becomes an important means by which control over farm resources may be exercised and changes in their use can be effected. Its effectiveness derives from the fact that capital represents a "strategic" factor in farm production. The effectiveness is more decisive when the supply of financial capital is controlled by policy, as in Greece. This and the lack of developed market mechanism call for clear-cut objectives of policy and well-defined criteria of operation in order to prevent misuse of capital funds.

The rate of investment in Greek agriculture has been estimated for the year 1938 at 17 per cent of the total investment; this represents 4 per cent of the farm income. For the post-war period 1948-51 the rate was 10 per cent of the farm income. This represents an average rate of investment in agriculture of 1.5 per cent of the national income, a figure far below needs as estimated for development purposes in similar cases [UN 1951, p. 72]. The emphasis on agricultural capital development has been placed primarily on investment off the "going" farm in an attempt to improve supply of agricultural land. Overall investment in agricultural projects may contribute much to the conservation and improvement of national land resources; but it does not necessarily mean direct improvements in the efficiency of the individual farm units. Improving productive efficiency of the individual farm is what primarily counts for a self-generating development. This calls for heavy investment in the human agent and in research toward improved technology and the adaptation of new techniques.

Finally, we should note another policy essential, that of promoting balanced development within agriculture. Greek agriculture, for instance, includes two major sectors. One is highly specialized in the production of export crops, and is faced with a highly competitive foreign market and hence with problems of cost and flexibility. This sector, however, has to rely for food and other similar wage-goods on the second and sharply underdeveloped sector, that of peasant type farming. The productive inefficiencies of this second sector create a sort of external diseconomy to the commercialized farming segment and to the non-farm industries. This fact reinforces the urgency of reorienting policy toward improving the efficiency of the low-income farm.

#### IV

To sum up, the basic features characterizing the present illustrative case of the Greek agriculture are: (1) the shortage of agricultural land that makes any further improvement through land expansion prohibitive; (2) redundant, but not easily transferable, labor on the farm; (3) very low productivity of land and other capital assets, even lower than the market price for capital funds; (4) a combined return to labor and capital equally low, but without

major allocative inefficiency in the use of labor resources; (5) farm resources allotted among a large number of small units, of peasant type and with inferior technology, in large part; (6) farm operators extensively organized in a centralized, widespread, government supervised system of farm cooperatives.

In such a setting, capital development combined with technological changes within the "going" farms is the only path that can be seen toward any sizeable improvement. To this purpose, policy action should necessarily focus attention on the availability of capital funds, on research and extension, and on measures that would ease the impact of factors controlling the capacity of agriculture to absorb new investment efficiently. A large part of these goals may be achieved through adequate and well-managed financing, and through improvements in the management and the functioning of the farm organizations. In addition, traditional objectives of farm finance policy and rules of operation of the farm organizations must be adjusted to the new goals.

Generalizing, somewhat, the Greek experience, it may be pointed out that possibilities of development in a short-of-land agriculture lie primarily in the reserve productivity that is expected to exist in the already employed capital resources, including land. This is understood mainly in terms of a differential between their present level of productivity and the potential that may be achieved through the application of known improved techniques already developed in advanced countries. In such an effort, the capacity of agriculture, as an industry, to absorb new investment efficiently and to accept new technology stands as a major obstacle. This is not, however, the result of farmers' social or cultural attitudes, but rather of economic and institutional elements. The controlling impact of such elements may be eased, in many instances, through appropriate policy measures, in contrast to the cases where more fundamental issues of social and cultural changes are involved. (The low desire for higher income and the preference for leisure observed among farmers in some Latin American countries may be cited as an example of this last case).

The key factor seems to be the availability of producer goods and the financing that would make possible the necessary economic and technical changes. Financing, particularly, needs to be stressed. Shift from a peasant type farming to a commercialized operation is basically a question of financing the replacement of the low productivity employed assets with new, more efficient ones and financing the increased production outlays. Moreover, development of non-farm industries serving agriculture is conditioned by the lack of effective demand among the large number of farm operators. Adequate and appropriately oriented farm financing is the most effective means to stimulate a balanced, integrated development in this respect.

There remains, of course, the problem of concentrating the necessary funds. Domestic sources do not seem to be able to provide adequate amounts, and result to foreign financing is not easy, at least not for financing agricultural units; although the existence of efficient domestic financial organizations for agriculture could largely contribute to a solution of this latter type.

In conclusion, it may be stated that in the case of an underdeveloped agriculture of the Greek type, the major difficulties do not seem to be found in cultural and social attitudes, in human immobility, or in the lack of necessary economic organizations. The problem lies rather in efficient capital development. And from this point of view, policy action should be focused on:

1. Increasing financial availability of capital and on a well-planned credit policy that would promote the above outlined objectives;
2. Promoting technological advances which do not require major changes in farm organization;
3. Intensifying research and extension work as a means of adapting technology to local conditions and improving farmers' knowledge and managerial skills;
4. Measures that would overcome difficulties deterrent to the capacity of the individual farm to absorb efficiently new investment and financing;

5. Supplying agriculture with improved producer goods and services at appropriate cost;
6. Improving the functioning of the farm cooperative organizations, with the final objective to: (a) put them on a competitive business basis so that they become responsive to profit maximization pressures; (b) enlarge their scale of operation; and (c) develop able cooperative management;
7. Long-term credit facilities to promote consolidation of the farm holdings on a voluntary basis.

It is along these lines that the possibilities of development must be sought, and a planned development policy may achieve its basic goal of transforming and consolidating a peasant agriculture into a commercialized and more efficient farming.

George Coutsoumaris

Venezuelan Ministry of Agriculture

#### Notes

1. A more detailed analysis and empirical support of the views outlined may be found in Coutsoumaris [1953].
2. A situation similar to that was found in French agriculture [Thomson 1951]. The explanation suggested by Thomson for the French agriculture seems to be applicable also in the case of Greece. The lack of major differentials in returns to human agent as those observed in the more advanced economies of Great Britain and the United States seem to stem from the lack of adequate development in the non-farm industries.
3. Farm income per capita during the last four decades was persistently  $1/4$  to  $1/3$  of non-farm income per capita, despite the extensive farm price support program.
4. An example of this may be found in the Venezuelan agriculture. A recent farm credit survey revealed that the majority of the Venezuelan farm operators have an hostile attitude toward utilizing credit for their productive operations. And this in spite of the fact that farm land is more abundant and productivity of new investment quite high. Similar situations perhaps may be present in other Latin American countries, due to historical and social developments [CBR 1954].
5. Farmers' long agitation in Europe which followed the land reforms, and the political pressure for credit facilities adapted to the uncertain conditions and the changing production pattern must have an important bearing on this case.
6. This explains why tenancy problems, as well as pressure for new land distribution and for the settlement of landless farm families, are today again policy issues in Greece, in spite of the extensive land reform completed just 20 years ago.
7. It is evident that a misdirection and misutilization in money savings, even within the limited potentialities set by the income level, constitute another important handicap in capital development. Organizational changes and improvements in this direction are of equal importance.  
Greece following, to a large extent, developments in western European countries has established most of the needed economic institutions. In a productive structure of numerous small farm units, economic organizations play a crucial role in solving problems arising from technical indivisibilities and the smallness of operation. The creation and development of specialized financial organizations for agriculture have been in the past one of the major objectives of the farm policy in Greece.
8. Almost 75 per cent of the farm operators are organized into farm credit and other type cooperatives.

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